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DMAP PILOT'S GUIDE

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SECTION I

GENERAL

SCOPE

Purpose of this paper is to describe which are the DMG functions supported by the AW189 for the so called "Phase 5" configuration.

The DMG system provides the management of all standard map formats and incorporates enhanced terrain-referenced navigation capability in order to provide accurate position information.

APPLICABILITY

This document is applicable to the Leonardo Helicopters AW189 helicopter. The DMG is part of the AMMC equipment. This document is applicable to the AMMC software version 5.5.5. The DMG has been developed according to RTCA-DO178B level B and its SW P/N is 4F4620VM0201.

REFERENCE DOCUMENTS

Rif.	Doc. Num.	Title
1	189G4620U004	AW189 CABIN-PC and MISSION CONSOLE USER MANUAL
2	189G4620X015	AW189 Loading Procedure for Navigation Map

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SECTION II

DMG DESCRIPTION

This DMG Pilot's Manual describes the functionalities of the Leonardo Helicopters Digital Map Generator System installed on board of the AgustaWestland AW189 Helicopter.

The helicopter is provided with Digital Map Capabilities based on two independent Digital Map Generators (DMGs), one embedded in each AMMC.

According to the helicopter configuration, in particular related to the presence or not of a Mission Computer in the cabin, the following combinations will be possible:

- When no Mission Computer is installed on the cabin, both DMGs are available to the Cockpit;
- When a Mission Computer is installed on the cabin, the DMG2 only is available on the cockpit while the DMG1 is available to the cabin.

The DMG interactions available in the cabin are not described in this document; please refer to ref. doc. [1].

The AMMC provides integrated control and preset of DMG via MCDUs, CCDs, MFDs bottom menu.

This Pilot's Manual reflects the AW 189 configuration specified in "Applicability" section.

This Pilot's Manual is organized in Sections with the purpose to describe specific Operational uses of the DMG.

The following Sections are included in the Manual:

- The DMG Control Devices.
 - The MCDU. In this section the HMI rules used by the DMG are listed, in terms of colour coding, symbols, navigation rules and pages organization.
 - The MFD control menu. In this section are described the controls available in the bottom menu of the MFD.
 - The CCD. In this section are described the controls available through the CCD interactivity.
- Starting the DMG system. This section details the startup procedures and initialization conditions of the DMG.
- The DMG interactions and functions. This section details the DMG functions with the relevant interactions using the MCDUs, CCDs, and MFDs control menu.

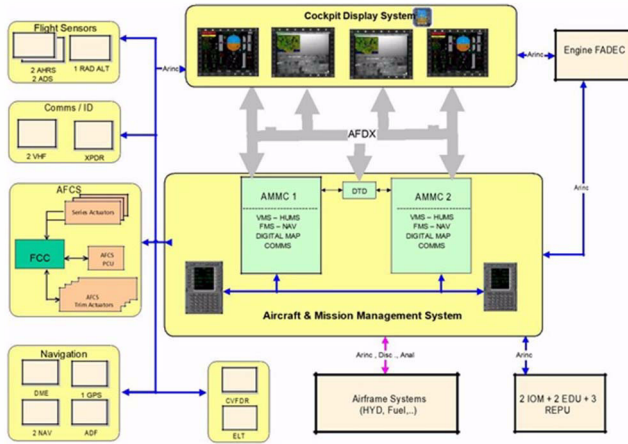
- FMS interactivity: this section describes the capability of interacting with the FMS from the map pages.
- Mission Management functions. This section describes the mission management functionalities available within map presentation when the relevant option are installed, in order to manage the RADAR, AIS, FLIR mission equipments.
- Troubleshooting. In this chapter some typical problems are presented to give to the Operator a resolution key.
- Appendix. In this chapter the type Maps that can be loaded in the database are presented.

The DMG system provides the management of all standard map formats and incorporates enhanced terrain-referenced navigation capability in order to provide accurate position information.

The DMG functions illustrated in this Manual are:

- Display of the map according to North-up and Heading-up direction.
- Display Vector and Raster Map types.
- Vector data declutter capability.
- Display of map content in multilayer format.
- Zoom capability and change of scale.
- Display Centre Control (aircraft position center, bottom and PosCenter) and Panning function.
- Predicted Flight Path visualization.
- Altitude at Cursor.
- Terrain functions management: Terrain Above Elevation and Elevation banding.
- Opacity management in multilayer presentation.
- Line of Sight computation and display.
- Display of overlay information and data (grid information, symbols, navigation database information, mission layer and images)
- Map preset saving and loading.
- Search over textual database and map positioning on results.
- FMS interactivity.

The following picture describes the logical scheme of the Avionic Architecture and the connections between the AMMC, hosting the DMG, and the remaining avionic equipments.



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Figure 2-1 Avionic Architecture and connections scheme

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SECTION III

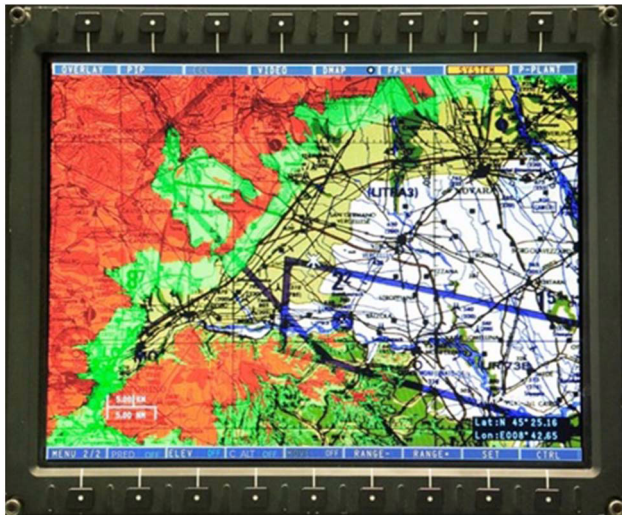
THE DMG CONTROL DEVICES

The AMMC provides integrated control and preset of DMG via MCDUs, CCDs, and MFDs control menu.

THE MFD CONTROL MENU

The AMMC outputs one video signal, buffered to drive two Multi Function Displays. The DMG provides a display of 1024x768 pixels and provides colour map imagery as an analogue video signal in XGA format resolution.

The MFD is connected from/to the AMMC/DMG via an AFDX link. The AMMC manages on the MFD a DMAP CONTROL MENU to control DMG settings. The Operator may use the MFD DMAP CONTROL MENU as primary device for interfacing with the DMG.



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Figure 3-1 MFD DMAP control menu

The MFD DMAP CONTROL MENU is displayed on the MFD bottom row and it is splitted in the following sub-menus according to the helicopter detailed configuration and option settings.

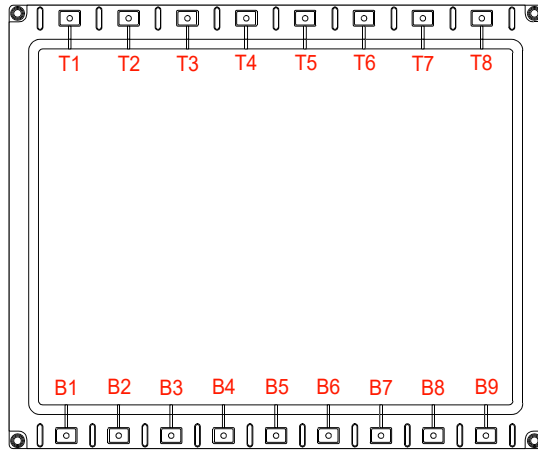
When no Mission Management functionalities are provided (i.e. SAR Option is different from "SAR LAYERS"), the following sub-menus are available:



When the Mission Management functionalities are provided (i.e. SAR Option set equal to "SAR LAYERS"), the following sub-menus are available:



The MFD has nine push buttons to activate the corresponding function. See specific section for MFD DMAP functions management.

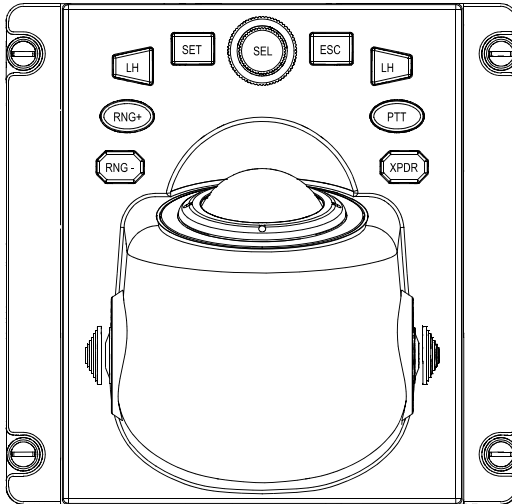


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Figure 3-2 MFD pushbuttons

THE CCD

The CCD is allocated to control and select MFD data functions: range and cursor. The CCD interfaces outside DUs through one A429 line. The DMG system uses the CCD for some functions such as the panning mode and range increase/decrease. See specific sections for CCD DMAP functions management.



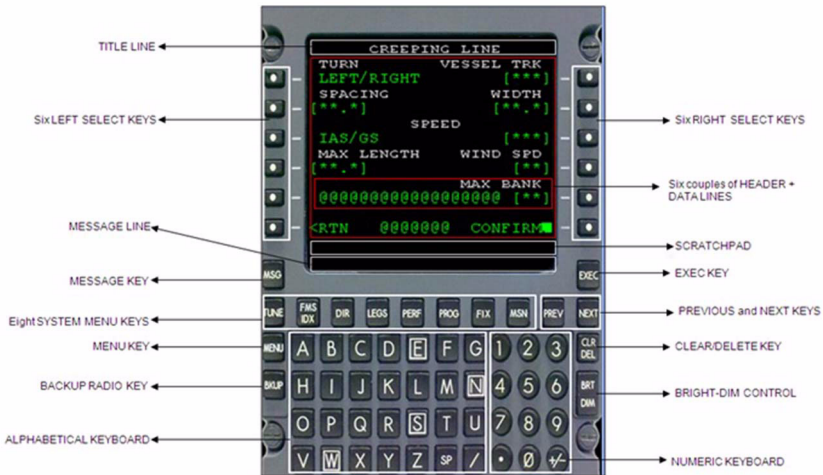
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Figure 3-3 Cursor Control Device

THE MCDU

The Operator may use the MCDU device for interfacing with the DMG. The MCDU is connected to the AMMC via an Arinc 739 logical protocol supported by an Arinc 429 physical protocol. The MCDU is composed by the following parts:

- a display;
- Line Select Keys (LSK). Six are on the display left side and six are on the display right side. All of them are vertically positioned;
- a Scratchpad used to enter data;
- a Numeric keyboard (that includes numbers from 0 to 9, the dot and the key "+/-");
- an Alphabetical keyboard (that includes letters from A to Z, the space and the dash);
- PREV and NEXT keys used to navigate Horizontal pages;
- EXEC key used to perform executable actions and an EXEC lamp (in the Message Line);
- CLR/DEL key used to clear the scratchpad (CLR) or to delete data (DEL);
- MSG key used to display avionic messages and alerts and a MSG lamp (in the Message Line);
- MENU key used to display the FMS Start Up page;
- System Menu keys (SMK) used to reach the Top pages:
 - TUNE: to tune Comms and Nav aids;
 - FMS: to display FMS top page;
 - DIR: to manage the FMS DIRECT TO;
 - LEGS: to manage the active Flight Plan;
 - PERF: to manage the Helicopter and FMS Performances;
 - PROG: to manage the Progress pages
 - FIX: to manage the FIX page;
 - MSN: to manage Mission pages.



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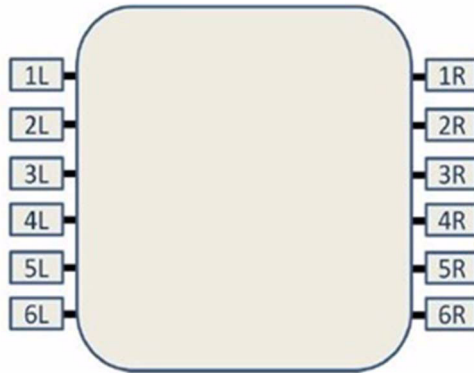
Figure 3-4 MCDU

THE MCDU DISPLAY

The MCDU display contains 15 rows; each of them comprises 24 characters. The first row on the top is the title line and is used to display the title page. The last row is the Message line and the 14th row is the scratchpad. Whenever the Pilot presses a Numeric or Alphabetical keyboard key then the scratchpad echoes the chosen number or letter.

The remaining 12 rows are used to display information, data and commands (see next section) and are managed as six couples of header and data lines. The data lines are adjacent to the LSK (Line Select Key) and the corresponding header line is just over the data line.

In this Pilot's manual the following MCDU simplified picture is used to give operational examples:



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Figure 3-5 MCDU simplified picture

The Scratch Pad

The scratchpad is the fourteenth row of the MCDU display and has four functional working modes: edit, delete, confirm and error message.

The default working mode is the edit one. No legend is used to state this condition. The others modes are consequence of a DMG action activated by a Pilot command.

When in editing mode the scratchpad echos the keypresses entered by the Pilot. The keypresses do not have any DMG effect until they are associated to a LSK. The Pilot can therefore verify the correctness of the input value before finalizing desired DMG action, by pressing the desired LSK.

The data is cleared from the scratchpad when a command is successfully executed, but is maintained during successive pages navigation (if the requested page is even a command then the scratchpad is cleared).

These are the rules applied to any entry generated by a keyboard keypress and then echoed in the scratchpad:

- the echoed characters are displayed in normal white color
- the maximum number of characters accepted in the scratchpad are 22, the subsequent ones are ignored
- space (SP) characters inserted at the end of the scratchpad string are ignored by DMG while spaces followed by other chars are included in scratchpad validation
- the Pilot can delete last scratchpad character by pressing the CLR DEL key; if the scratchpad is empty then the keypress puts it in delete mode
- the Pilot can delete the entire scratchpad content by holding down CLR DEL key until the scratchpas is cleared; if the scratchpad is already empty then the keypress puts it in delete mode
- the +/- key is used to change the scratchpad content sign even if the displayed string does not represent a number. The '+' symbol is not displayed. For example: if '1234' is displayed in the scratchpad the +/- keypress changes the string to '-1234', a subsequent +/- keypress brings back the value to '1234'.

The delete scratchpad mode, recognizable by the inverse video DELETE string put in the scratchpad centre, is described in the CLEAR/DEL section.

The message scratchpad mode, recognizable by the presence of an error message inverse video in inverse video in the scratchpad centre, is entered when a Pilot DMG command results in an error. Error messages are command specific however similar conditions, met in different requests, generate the same message.

The scratchpad edit mode, along with its content, can be restored by pressing any key.

The DMG generates error messages in the scratchpad, to indicate that the interaction has not been closed positively.

The scratchpad confirm mode, recognizable by the inverse video CONFIRM string in the center of the scratchpad, is entered when the requested DMG command needs Pilot confirmation in order to be finalized. The edit mode, with its contents, is restored By pressing any key with the exception of the EXEC key.

The Numeric and Alphabetic Keyboards

The MCDU keyboards are used to input data to DMG. All alphanumeric input are displayed in the scratchpad.

These are the possible input characters:
(for their location refer to figure above)

- numbers from 0 to 9
- dot and “+/-” keys
- letters from A to Z
- space (SP) and dash keys.

The Message Line

The Message line is the fifteenth and last row of the MCDU display. There are two possible indications, both shown as a white inverse inverse videolegend:

- an EXEC input is needed for finalizing an active MCDU session, indicated by an EXEC string displayed at the end of the line
- at least one raised Alert message has not yet been acknowledged, indicated by a MSG string displayed at the beginning of the line.

Note that:

- the EXEC string is cleared when the required input is provided or the Pilot abandons the update session
- the MSG string is cleared when all the raised alerts are acknowledged, a new alert occurrence re-activates the legend.

The PREV and NEXT Keys

PREV and NEXT keys are used for horizontal pages navigation. The mm/nn title line notation, where mm is the current displayed page while nn is the total number of the pages, identifies that the showed page is a parallel one.

Horizontal pages are managed as a circular list: page 1/nn is displayed when NEXT is pressed on nn/nn page (last one) while PREV pressing on nn/nn page (the last one) displays the 1/nn page (the first one).

The EXEC Key

Whenever an EXEC input is needed for finalizing an active MCDU session, the DMG shows, at the end of the Message line, a white EXEC string in inverse video. At this point, the EXEC key pressing provides the confirm for function execution.

The EXEC legend is displayed only for those commands that functionally require that kind of input.

The EXEC key while the EXEC legend is not displayed does not have any effect on the current MCDU session. However if the scratchpad is in delete/message/confirm mode the EXEC key, like all the other keypresses, returns the scratchpad to the edit mode.

The CLR/DEL Key

The CLR/DEL key is a context-sensitive input that depends on the current scratchpad mode.

When a Pilot input string is echoed in the scratchpad the CLR/DEL keypress causes the last char string deletion and if the same key is held down for more than 1 second it clears the entire displayed string.

When the scratchpad is empty the CLR/DEL keypress opens a delete session and puts the scratchpad mode in delete mode. This condition is identified by a DELETE string in inverse video displayed in the middle of the scratchpad. A subsequent LSK keypress provokes one of the following actions:

- delete the selected item
- restore System Data value for enterable selected data
- reset manual inserted value for enterable selected data
- restore default value for enterable selected data

After the delete/reset function execution the delete session is closed, the DELETE string is cleared from the scratchpad, which returns to the edit mode with its previously content displayed, if any.

Any other keypress (included LSK that are not associated to data/items that can be reset or deleted) closes the delete session, i.e. the scratchpad is put in edit mode with the previously defined content displayed, if any.

The MSG Key

The Message (MSG) key is used to display alerts information. The Pilot is advised to check the Alerts page by a MSG indicator on PFD and a MSG legend on MCDU Message Line. If the MSG indicator/legend is not present, the MSG key pressing displays an empty page.

The MSG indicator/legend is cleared when all the info contained in the Alerts page are acknowledged by the Pilot.

The MENU Key

The MENU page is displayed when the Menu key is pressed. To be noted that the page displayed after the AMMC power-on is not the MENU but the DB IDENT (that on the page tree is achievable by 5R LSK pressing on MENU page).

Display Brightness Control

When the BRT/DIM keys are used the MCDU display intensity increases or decreases and continues until the key is released or maximum/minimum adjustment is obtained.

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SECTION IV

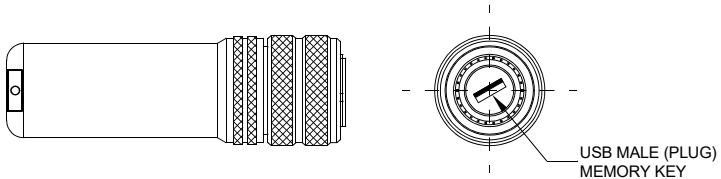
STARTING THE DMG SYSTEM

This present chapter describes the DMG System start-up process and provides additional information about the Database Management. Before start-up the DMG System, find below some information regarding the storage system.

THE DMG STORAGE CAPABILITY

The DMG system storage capability is the following:

- a 128 Mbytes FLASH memory for each AMMC, where the BACKUP map database could be located;
- an USB 2.0 device (a PEN DRIVE with a capacity up to 256 GB, FAT32 formatted) for each AMMC, where the PRIMARY map database is located and accessed at run time phase.



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Figure 4-1 USB 2.0 device

Operation without inserted the USB device:

- The Digital Map Generator can operate without an inserted USB device, if a backup database is present. If the DMG operates without the USB device, the BACKUP database, loaded on the internal flash memory, will be used.

Operation with inserted the USB device:

- The DMG will work with the PRIMARY DB loaded on the USB memory. If, at run-time, the USB connection is lost, the DMG Board will revert working with Backup DB on Flash memory (if present).

Note

How to upload a PRIMARY or a BACKUP DB is not described in this manual. Please refer to ref. doc. [2].

THE DMG INITIALIZATION

At AMMC power on, the Initialization pages are used to verify/insert data for the FMS.

The following MCDU screenshot describes the DB IDENT page and is the default page presented at AMMC power on:



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Figure 4-2 DB IDENT page on MCDU

Pressing the MSN SMK the following MCDU page is displayed allowing the Pilot/Copilot to access the main Mission functions. The presence of each of these functions depends on the configuration.

The following depicted MCDU page foresees the presence of two DMAP channels (DMAP1 and DMAP2) and AIS.



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Figure 4-3 MSN page on MCDU

DMAP1 and DMAP2 subpages layout and functionalities are the same for both maps. The title line allows to distinguish which DMAP is currently operated. DMAP2 is presented as example in the next pages.

Selecting DMAP2 Key (LSK3R), the DMAP TOP page is presented:

Selecting DMAP Key (LSK4L), the DMAP TOP page is presented:



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Figure 4-4 DMAP TOP page on MCDU

During the boot process no user action is necessary. The booting process is finished after the STATUS (LSK2L) on MCDU page is DMG GO and,

- without an USB device inserted: BACKUP is displayed as ACTIVE DB (LSK5L) if a BACKUP DB is available on the AMMC (see [Figure 4-5](#));
- with an USB device inserted: PRIMARY is displayed as ACTIVE DB (LSK5L) (see [Figure 4-6](#));
- if neither a USB device is inserted nor a BACKUP DB is present, FAIL is displayed as ACTIVE DB (LSK5L) (see [Figure 4-7](#)).



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Figure 4-5 DMAP TOP page without an USB device inserted and with BACKUP DB



189G4600X008-0111-01

Figure 4-6 DMAP TOP page with an USB device inserted



189G4600X008-0112-01

Figure 4-7 DMAP TOP page without an USB device inserted and without BACKUP DB

THE DATABASE INFO

Pressing the ACTIVE DB Key (LSK5L) the following data is displayed:



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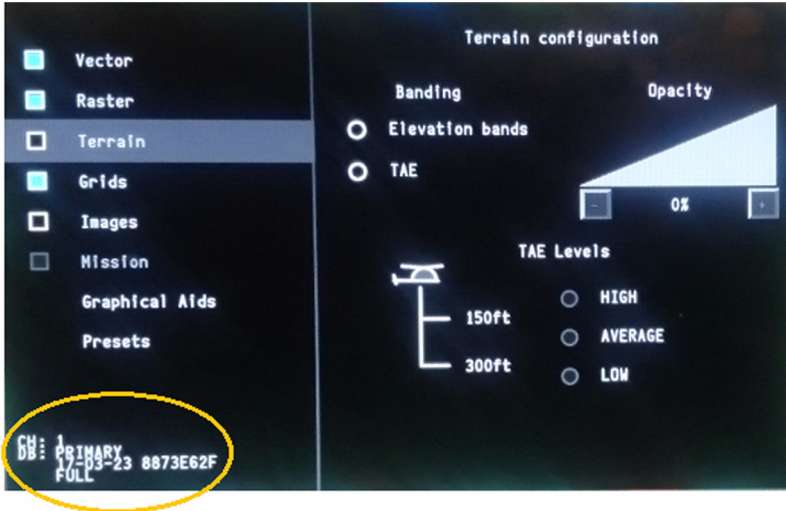
Figure 4-8 The database info

- without an USB device inserted: the BACKUP DB is in “OK” (LSK2L) status when the DB reports no failures
- with an USB device inserted: the PRIMARY DB is in “OK” (LSK1L) status when the DB reports no failures.

When a valid Database is managed by DMG (PRIMARY or BACKUP DB), further information of the Database currently loaded is displayed on the MCDU:

- DB DATE (LSK1R) reports the creation date of the Database;
- DB CRC (LSK2R) reports CRC of the Database;
- DB IDENT (LSK3R) reports the name of the Database.

The Database information are also displayed in the MFD DMAP LAYERS CONTROL PANEL (for details on how to open the panel, see “Setting Displayed Map Types by MFD CONTROL MENU” paragraph) as highlighted in [Figure 4-9](#).



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Figure 4-9 Database information on the MFD DMAP LAYERS CONTROL PANEL

THE DMG SHUT-DOWN

The USB Flash Device can be removed only when the AMMC is powered off. Removal of DMG USB Flash Devices is required only for maintenance task and for database updates. There is no need to manually power off/shut down the DMG: the DMG is automatically shutted down with the helicopter power off.

SECTION V

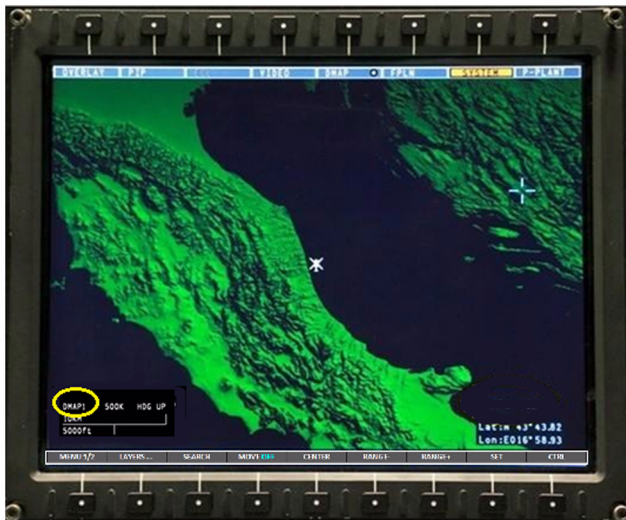
DMG FUNCTIONS

The DMG provides the management of several standard map formats and incorporates enhanced terrain-referenced navigation capability in order to provide accurate position information.

In order to display the Digital Map on MFD, the Operator should press the DMAP button on the MFD top menu. According to the helicopter configuration, the following combinations will be possible:

- If the Mission Computer is not installed (i.e. MISSION COMP set to "None"), both DMAP1 (to display map1 managed by AMMC1) and DMAP2 (to display map2 managed by AMMC2) will be available;
- If the Mission Computer is installed (i.e. MISSION COMP set to "CABIN PC"), only DMAP2 (to display map2 managed by AMMC2) will be available.

On the MFD there is an indication of the displayed Digital Map on MFD.



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Figure 5-1 Digital Map displayed on MFD

The DMG main functions and settings can be summarized as follows in the next chapters.

DEFAULT CONDITIONS

The default options for every feature are shown in the following table.

FEATURE	DEFAULT SELECTION
Map Type	RASTER ON VECTOR OFF TERRAIN OFF
Map Orientation Mode	NORTH UP
Map Move Mode	CENTER AC
Vector Layers	ALL ON
Terrain Above Elevation (TAE)	OFF
TAE LOWER TH	300 ft
TAE UPPER TH	200 ft
Elevation Banding	OFF
Predicted Path	OFF
Altitude at Cursor	OFF
TAE/ELEV Opacity	20%
Grid Type	NO GRID
IMAGE	No image displayed
RANGE	2.5NM
MISSION VECTORS	MISSION VECTOR OFF

Furthermore, the system saves in background the following features that will be automatically restored at the next power-up:

- Map Type;
- Vector Layers;
- Terrain above elevation;
- Elevation banding;
- TAE/ELEV opacity;
- TAE LOWER/UPPER TH;
- Grid Type;
- Image;
- Range;
- Mission vector;
- Predicted Path.

SETTING MAP ORIENTATION MODES

The Map Mode settings will determine the heading of the map and the A/C symbol and can be individually modified. The following settings are possible and have the following impact:

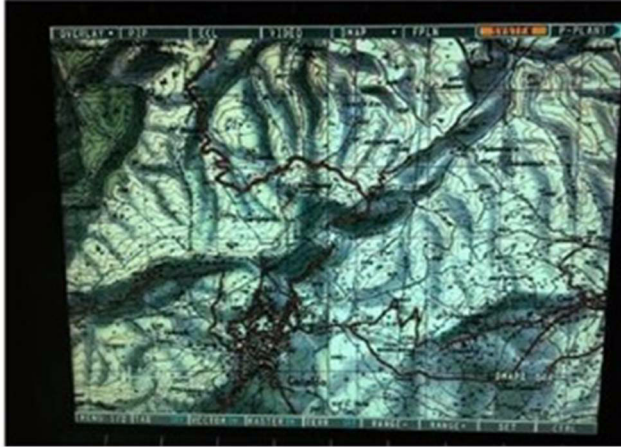
- In NORTH UP the symbol turns according to heading
- In HEADING UP the orientation of the A/C symbol remains unchanged, the map will turn.

The heading will be either “True” or “Magnetic” according to the helicopter setting.



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Figure 5-2 SETTING MAP ORIENTATION MODES (1 of 2)



189G4600X008-0017-01

Figure 5-2 SETTING MAP ORIENTATION MODES (2 of 2)

HOW TO CHANGE THE MAP ORIENTATION MODE BY MCDU

The Operator can select NORTH UP or HEADING UP mode pressing the Key (LSK4R). The default value is NORTH UP.



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Figure 5-3 Map Orientation Mode by MCDU

SETTING DISPLAYED MAP TYPES

The map of the DMG system consists of different map types depending on the area and the availability of maps. There are three basic different maps:

RASTER: Raster maps are maps like paper maps on the screen.

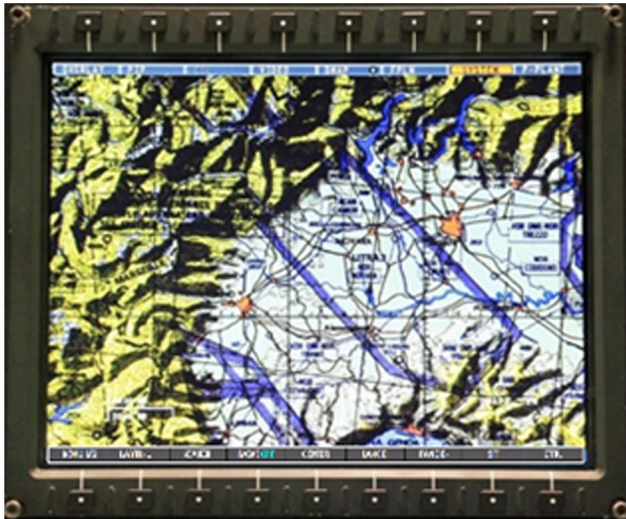
VECTOR: Vector maps are maps that are built from points, lines, polygons and labels.

They can be zoomed in a wide range of scales without losing quality and their colouring can be changed as part of the ground preparation.

TERRAIN: The DMG supports terrain elevation data such as DTED (Digital Terrain Elevation Data). This data will be graphically displayed as a map, using a simulated sun position to shade the terrain.

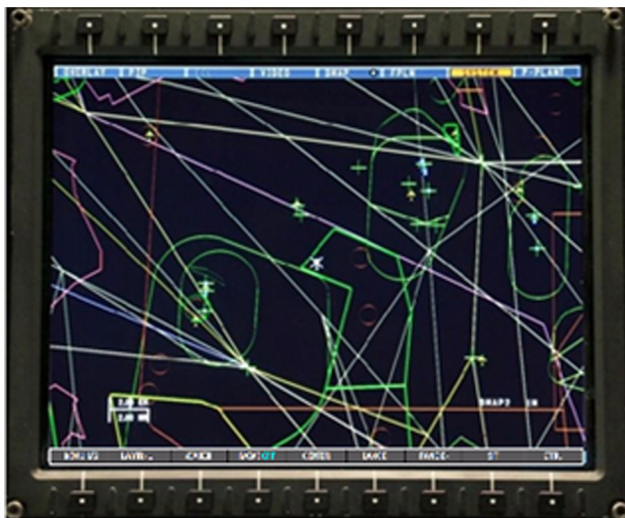
These maps can be merged with all the possible combinations.

The Operator can perform setting of displayed map types, through the MCDU or the MFD CONTROL MENU.



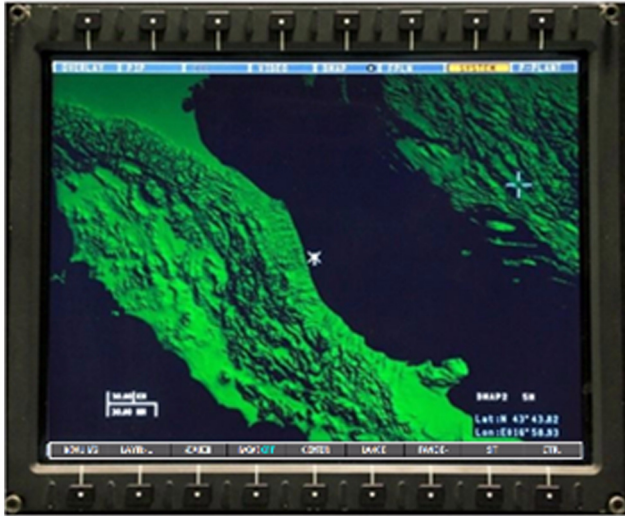
189G4600X008-0117-01

Figure 5-4 RASTER map



189G4600X008-0118-01

Figure 5-5 VECTOR map



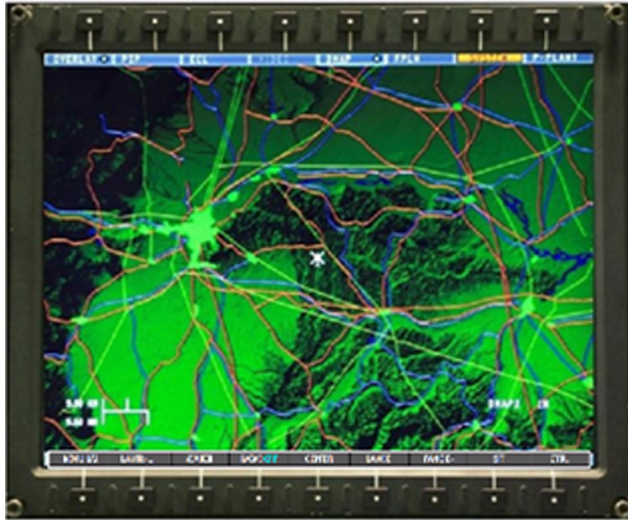
189G4600X008-0119-01

Figure 5-6 TERRAIN map



189G4600X008-0120-01

Figure 5-7 RASTER+VECTOR map



189G4600X008-0121-01

Figure 5-8 TERRAIN+VECTOR map

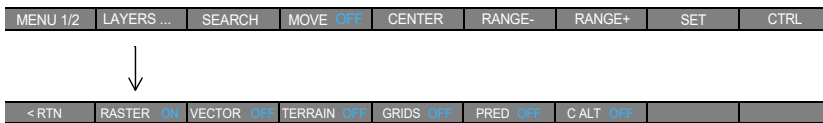
SETTING DISPLAYED MAP TYPES BY MFD CONTROL MENU

The Map Types can be set through the MFD DMAP LAYERS MENU and they have the following impact:

- pressing RASTER ON/OFF: enable / disable the representation of RASTER map data for all zoom levels
- pressing VECTOR ON/OFF: enable / disable the representation of VECTOR map data for all zoom levels
- pressing TERR ON/OFF: enable / disable the representation of TERRAIN map data for all zoom levels.

The LAYERS menu is accessible pressing the LAYERS Button 2 on DMAP CONTROL MENU.

Here below, the LAYERS bottom menu:

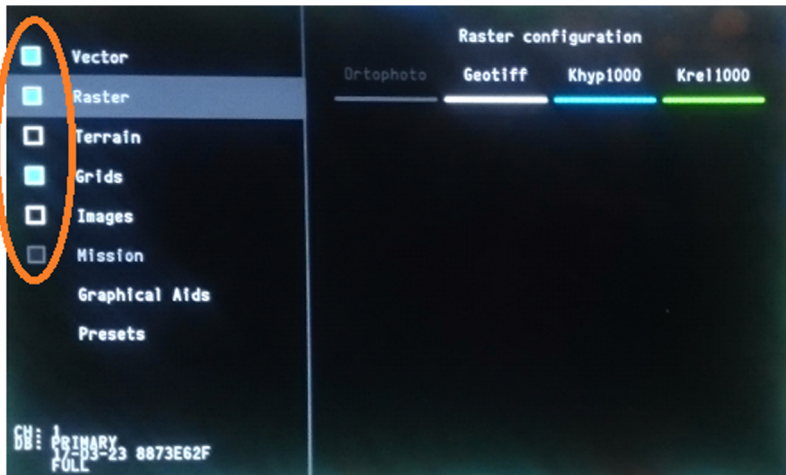


Pressing the button has also the effect to open the MFD DMAP LAYERS CONTROL PANEL where a further set of DMAP control functions are available.

The panel is organized into the sections listed in the left column. Clicking an item name in the left column changes the rightmost panel in order to display the relevant configuration options (Note Raster map type that is highlighted in gray in the example in the following picture).

The Map Types can so be set also through this PANEL as depicted in the following picture, selecting or deselecting the highlighted check boxes.

The MFD DMAP LAYERS CONTROL PANEL can be closed pressing the <RTN button on the LAYERS bottom menu or by a cursor selection outside the panel itself.



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Figure 5-9 DMAP control functions on the MFD DMAP LAYERS CONTROL PANEL

For each map type, the map manages a database organized in maps datasets each one consisting of a set of homogeneous maps and relevant supported ranges.

For VECTOR and RASTER, up to 8 data sets are managed.

In the above picture an example with 4 data sets (Ortophotos, Geotiff, Khyp1000 and Krel1000) is displayed.

The following colour code is is foreseen for data sets:

- cyan: current selected data set
- green: data set that can be selected without implying a range change (see also Par. DATASETS and RANGE relation)
- white: data set whose selection implies a range change (see also Par. DATASETS and RANGE relation)
- grey disabled: no coverage for this data set at current coordinates.

[Functional limitation: it occasionally happens that the DMAP LAYERS CONTROL PANEL remains open also having pressed the <RTN button. Selecting on the MFD top menu a page different from DMAP (for instance FLPN) and the reselecting DMAP, the problem is recovered.]

SETTING DISPLAYED MAP TYPES BY MCDU

In order to set a map type the Operator should press LAYERS page on the MDCU. The following settings are possible and have the following impact:

- VECTOR (LSK1L): a selected VECTOR map is displayed
- RASTER (LSK2L): a selected RASTER map is displayed
- TERRAIN (LSK4L): a selected TERRAIN map is displayed.

Each of these buttons can be displayed in amber colour in case no data set is available for the relevant map type in the map database.

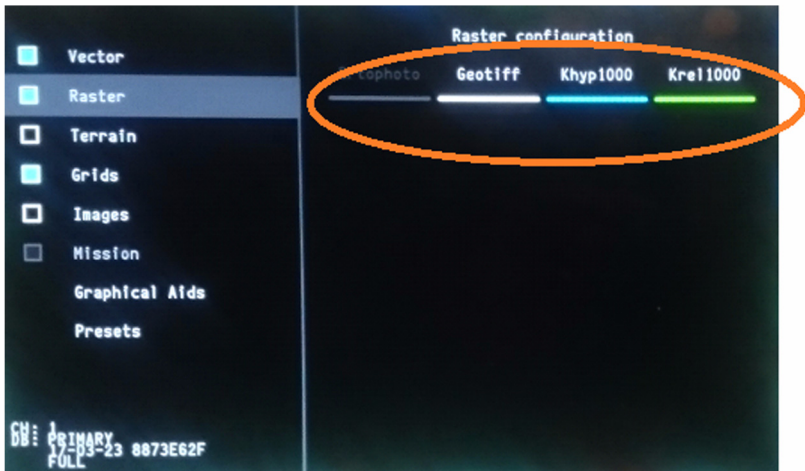


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Figure 5-10 Setting Displayed Map Types by MCDU

How to change the RASTER DATA SET by MFD

On DMAP LAYERS CONTROL PANEL on the MFD, if the MAP TYPE selected is RASTER ON, it is possible to change the RASTER DATA SET positioning the cursor on the desired one and pressing the ENTER button on the CCD. The panel represents an example where 4 datasets are available in the database.

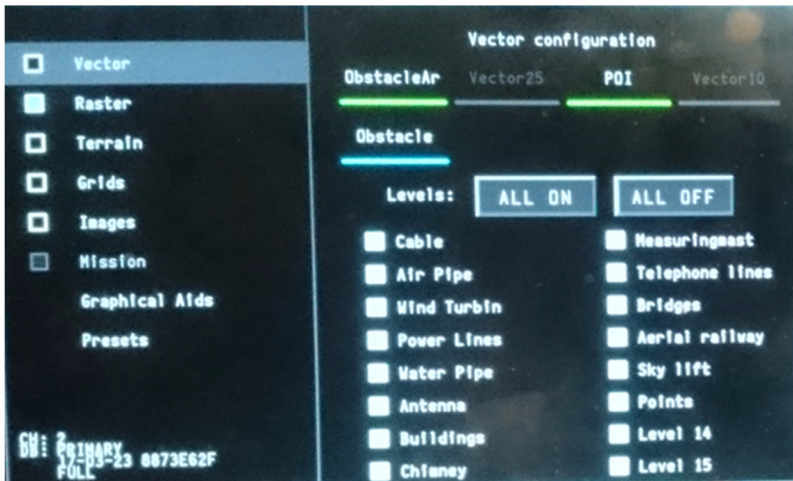


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Figure 5-11 RASTER DATA SET change by MFD

How to change the VECTOR DATA SET by MFD

In the DMAP LAYERS CONTROL PANEL on the MFD, if the MAP TYPE selected is VECTOR ON, it is possible to change the VECTOR DATA SET displayed positioning the cursor on the desired one and pressing the ENTER button on the CCD. The panel represents an example where 5 datasets are available in the database.



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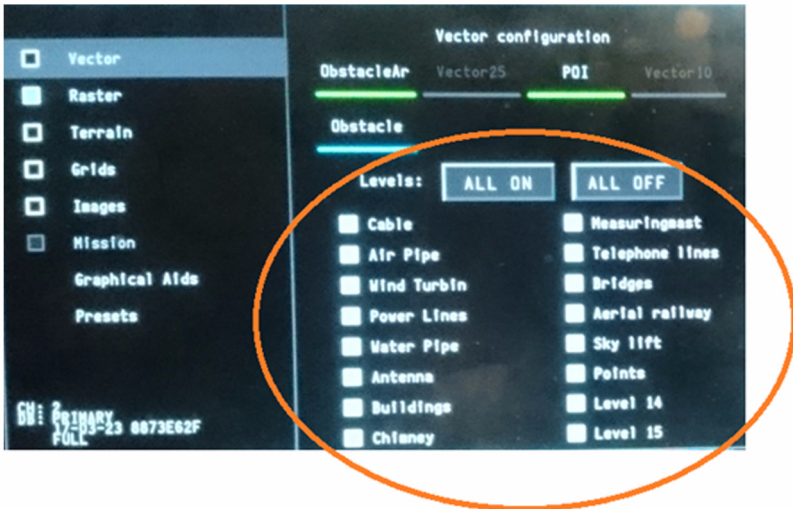
Figure 5-12 VECTOR DATA SET change by MFD

HOW TO MANAGE THE VECTOR LAYERS BY MFD

Via the DMAP CONTROL PANEL page on the MFD, the VECTOR LAYERS, for the given Vector Map, can be switched ON/OFF to be visualized according to pilot request and to the database availability.

These layers are used to display different vector information, for example airports, airspace boundaries, holding patterns or other vector features.

The Vector Layers are up to 16. The Operator can enable/disable a single layer, checking the relevant box or all layers through the command "ALL ON". The command "ALL OFF" will remove all layers from the display. The default value is "ALL ON".



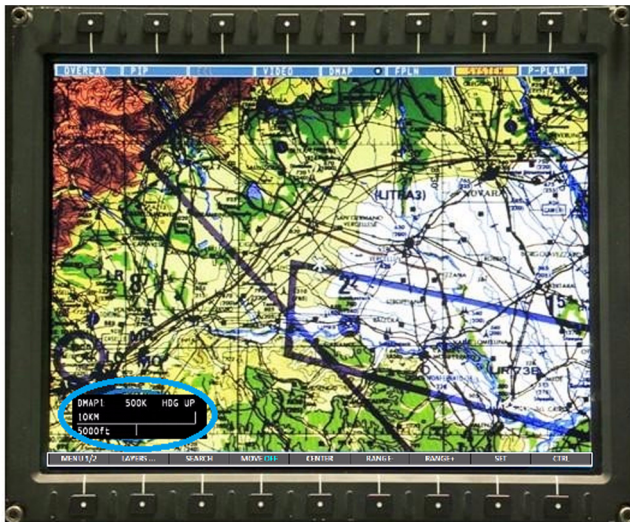
189G4600X008-0126-01

Figure 5-13 VECTOR LAYERS management by MFD

SETTING THE RANGE

The Operator can perform zooming of the displayed map, through either the MCDU, the MFD CONTROL MENU or the CCD.

A range indication (distance in KM and NM) is presented on the displayed map.



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Figure 5-14 Range indication for displayed map on MFD

HOW TO CHANGE THE RANGE BY MFD CONTROL MENU

On the MFD CONTROL MENU page pressing RANGE- button, the zoom in is performed on the same displayed scale, until the zoom value exceed the maximum value and the next smaller map scale is automatically selected.

Pressing RANGE+ button, the zoom out is performed on the same displayed scale, until the zoom value exceed the minimum value and the the next bigger map scale is automatically selected.

OPTION SAR set to "Basic":



OPTION SAR set to "SAR LAYERS" or "SAR FULL" :



HOW TO CHANGE THE RANGE BY MCDU

In the DMAP SETUP page on MCDU, pressing RANGE DECREASE (LSK5L), the zoom in is performed on the same displayed scale, until the zoom value exceed the maximum value and the next smaller map scale is automatically selected.

Pressing RANGE INCREASE (LSK5R), the zoom out is performed on the same displayed scale, until the zoom value exceed the minimum value and the the next bigger map scale is automatically selected.



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Figure 5-15 RANGE change by MCDU

HOW TO CHANGE THE RANGE BY CCD

In the CCD, pressing RNG- key, when the cursor is active on the DMAP presentation, the zoom in is performed on the same displayed scale, until the zoom value exceed the maximum value and the next smaller map scale is automatically selected.

In the CCD, pressing RNG+ key, when the cursor is active on the DMAP presentation, the zoom out is performed on the same displayed scale, until the zoom value exceed the minimum value and the the next bigger map scale is automatically selected.

DATASETS AND RANGE RELATION

At MAP DB level, DATASETS are associated to RANGES where they are available.

Each time a RANGE CHANGE is required, and a RASTER (or VECTOR) layer is active, the displayed DATASET will be:

- The current selected one, if available at this range or
- The last selected one for the required range, if any, or
- The first configured DATASET in the list of the available ones for this range (this configuration is performed at MAP DB level).

[Functional limitation: Each time a DATASET change is required, the smallest range available for this DATASET is selected and not the nearest scale with respect to the current selected one.]

PRESENTATION OF IMAGES

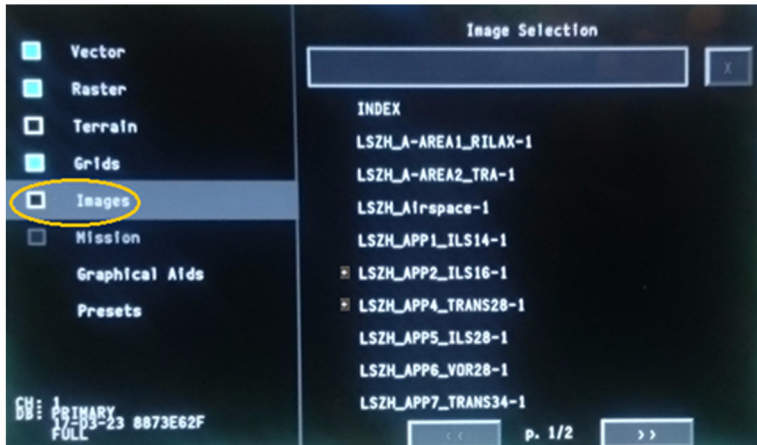
The operator can activate/deactivate image visualization via IMAGES (LSK3L) button on MCDU. The button can be displayed in amber colour in case no image is present in the map database.



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Figure 5-16 Images activation/deactivation by MCDU

The operator can also activate/deactivate image visualization via IMAGES check box on DMAP LAYERS CONTROL PANEL. The check box is disabled in case no image is present in the map database.



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Figure 5-17 IMAGES check box on DMAP LAYERS CONTROL PANEL

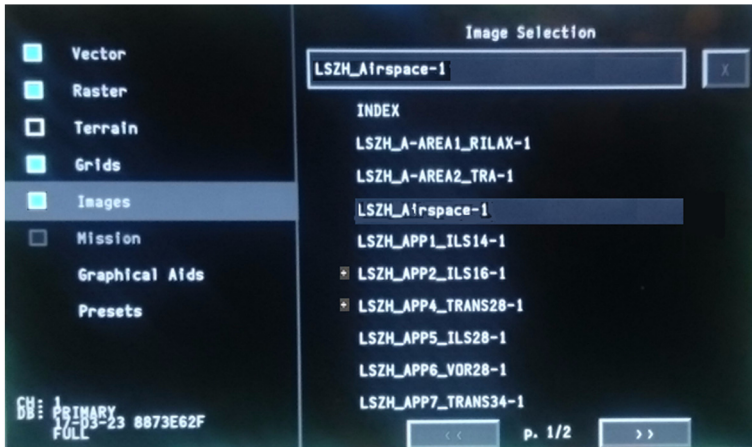
The Operator can select/de-select images (JPEG, BMP or TIFF file format) to be displayed overlaid to the current map, through the DMAP LAYERS CONTROL PANEL on MFD. It is possible to manage up to 100 images (centered on the MFD), up to 100 geo-localised images (localised in a geo position) and up to 65 geo-referenced images (localised in a geo position and oriented).

The IMAGES configuration section allows navigation through a list of the images to select one image and to clear the display of the currently selected one.

Geo-localised and geo-referenced images are marked by a special symbol put on the left side of the image name.

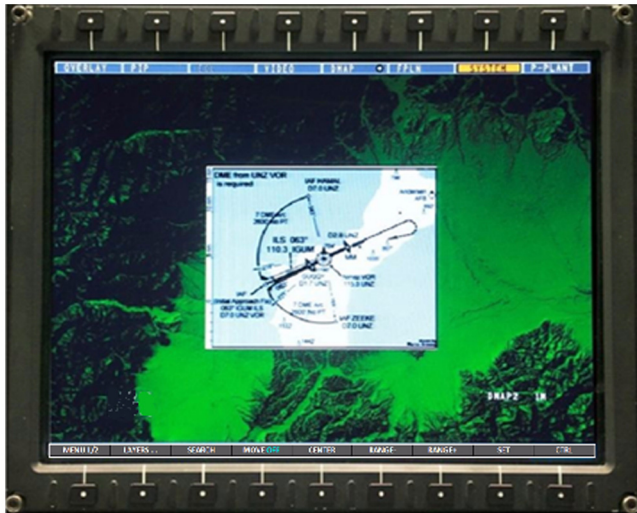
The operator can select an image clicking on it in the panel. Once selected, the image name is highlighted and also displayed into the box at the top of the IMAGE configuration section as depicted in the following image.

To remove the selected image from the display the operator can click on the 'X' button that is placed on the right of the box.



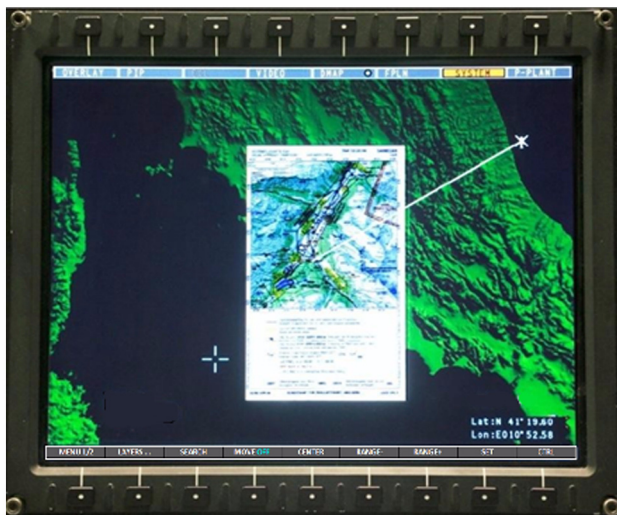
189G4600X008-0130-01

Figure 5-18 IMAGES selection on DMAP LAYERS CONTROL PANEL



189G4600X008-0131-01

Figure 5-19 Examples of Presentation of images (1 of 2)



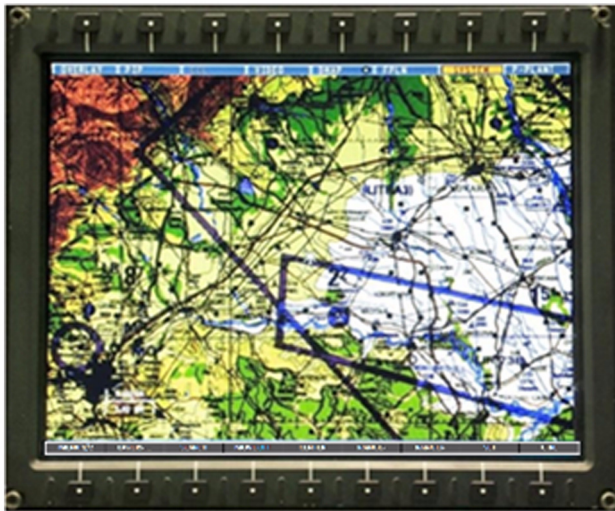
189G4600X008-0132-01

Figure 5-19 Examples of Presentation of images (2 of 2)

SETTING MOVE MODE

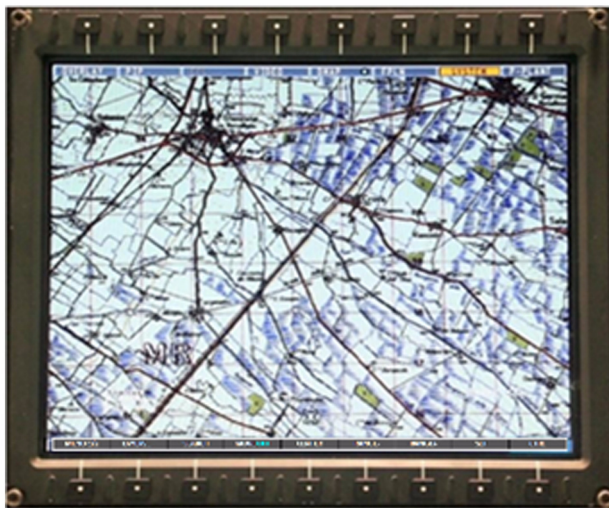
There are four different modes of displaying the maps. The modes and the selections are as follows:

- CENTER AC: the A/C symbol will be placed in the middle of the map sector
- BOTTOM AC: the A/C symbol will be placed at the lower area of the map screen
- POSCENTER: it is possible to select a latitude/longitude to re-centre the map on a GEO position
- PANNING MODE: the map will scroll to 8 different directions (sliding the map on the screen).



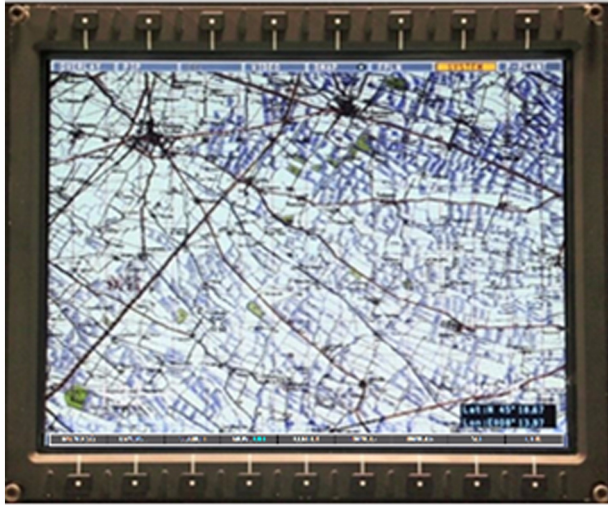
189G4600X008-0133-01

Figure 5-20 CENTER AC mode



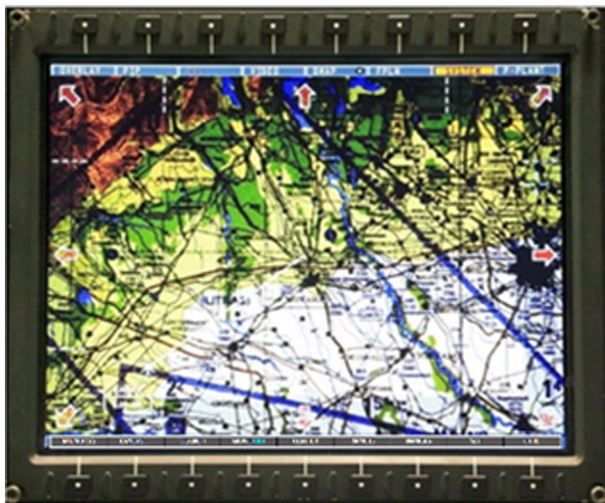
189G4600X008-0134-01

Figure 5-21 BOTTOM AC mode



189G4600X008-0135-01

Figure 5-22 POSCENTER mode



189G4600X008-0136-01

Figure 5-23 PANNING mode

HOW TO CHANGE THE MOVE MODE BY THE MCDU

In the DMAP MOVE page on MCDU, via CENTER AC (LSK1R) and BOTTOM AC (LSK2R) the position of the A/C symbol will be set:

- Via the option CENTER AC, the A/C symbol will be placed in the middle of the map sector
- Via the option BOTTOM AC, the A/C symbol will be placed in the lower area of the map screen.



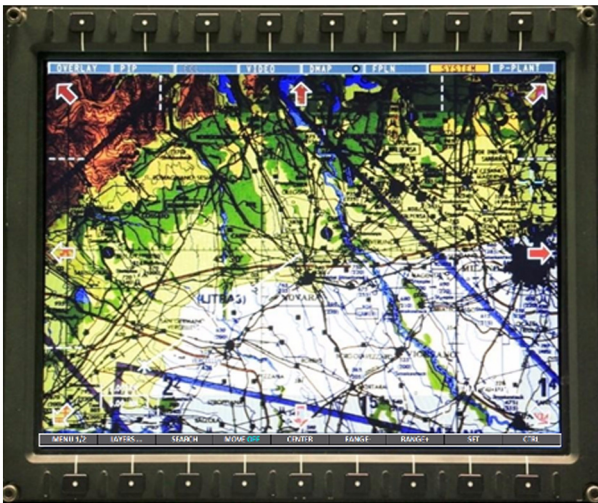
189G4600X008-0137-01

Figure 5-24 DMAP MOVE page - Move Mode change on MCDU

In the LAT CENTER Key (LSK1L) and LONG CENTER Key (LSK2L) it is possible to insert a latitude/longitude to re-centre the map on the GEO position. The Operator shall insert correct LATITUDE and press EXEC Key. Then the Operator shall insert correct LONGITUDE and press EXEC Key. Pressing POSCENTER (LSK3R) the map will be centered on the inserted GEO position.

HOW TO SET THE PANNING MODE BY THE MFD CONTROL MENU AND CCD

To enable the panning mode, the Operator shall press on the MENU (or MENU 1/2) the MOVE ON button. This action enables 8 transparent areas, overlaid to map on MFD, with 8 arrows that represent 8 directions (Up, Left, Down, Right, Up-Right, Down-Right, UpLeft, Down-Left). Through the CCD, moving the Cursor on these areas, the map will scroll to 8 different directions (sliding the map in the screen) and a line of position of aircraft will connect the A/C position with the map center.



189G4600X008-0138-01

Figure 5-25 Panning Mode settings

When the Operator will take the Cursor out these areas, the map will stop.
A further way to scroll the map is using the knobs on CCD as detailed in the following table.

KNOB EVENT	DIRECTIONS
inner knob, counterclockwise	Up
inner knob, clockwise	Down
outer knob, counterclockwise	Left
outer knob, clockwise	Right

Using the ESC button of CCD or pressing the MOVE OFF button on the MFD DMAP CONTROL MENU it is possible to exit from MOVE function. In this way, exiting from the MOVE function, the A/C will return in the CENTER position.

Note

If a DMAP is used on a MFD and the MOVE function is active, the Operator should not use the same DMAP on the other MFD.

[Functional Limitation: When moving the map into a position other than CENTRE with vector label displayed on the screen the Labels of the vector data, if any, will appear shifted with respect to the centre of the display of a value that is the distance between the map centre and the display centre.]

HOW TO CENTER THE MAP ON A GEO POSITION BY THE CCD

Through the CCD, moving the Cursor on the map and pressing SET, the map will be centered on the cursor position and a line connecting the A/C position with the map center will be displayed.



189G4600X008-0139-01

Figure 5-26 Map centering on a GEO Position by CCD

The A/C will return in the center position if:

- the CENTER AC (LSK1R) is pressed on the DMAP MOVE MCDU page or
- the ESC button on CCD is pressed or
- the CENTER button on DMAP CONTROL MENU on MFD is pressed.



189G4600X008-0140-01

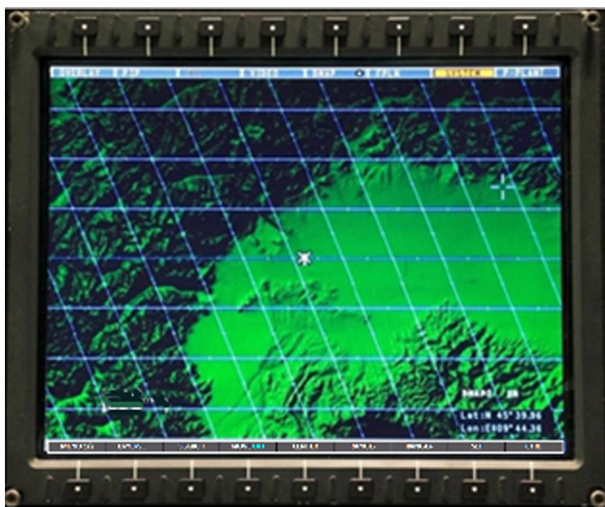
Figure 5-27 DMAP MOVE MCDU page

LAYERS ...	SEARCH	MOVE OFF	CENTER	RANGE-	RANGE+	SET	CTRL
------------	--------	----------	--------	--------	--------	-----	------

SETTING GRID TYPE

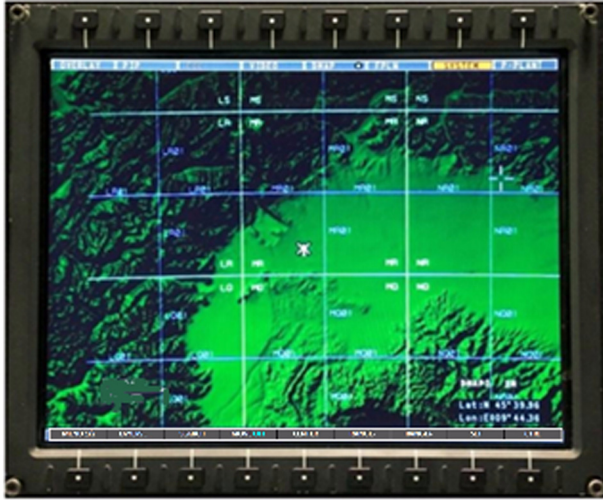
The DMG is able to display three Grids type overlaid to the map:

- Georef Grids;
- UTM Grids;
- Latitude and Longitude Grids.



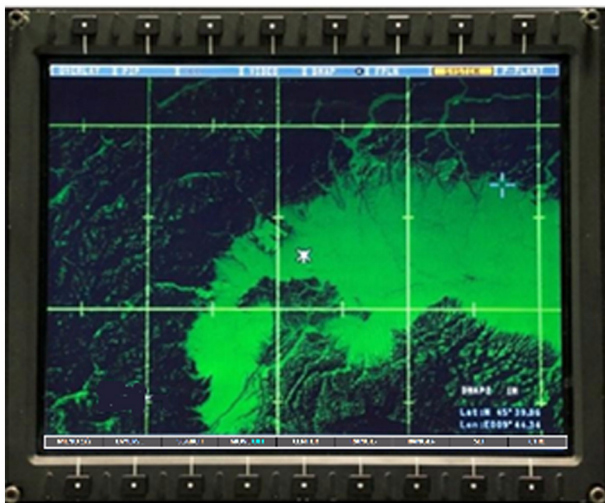
189G4600X008-0141-01

Figure 5-28 Georef Grids



189G4600X008-0142-01

Figure 5-29 UTM Grids



189G4600X008-0143-01

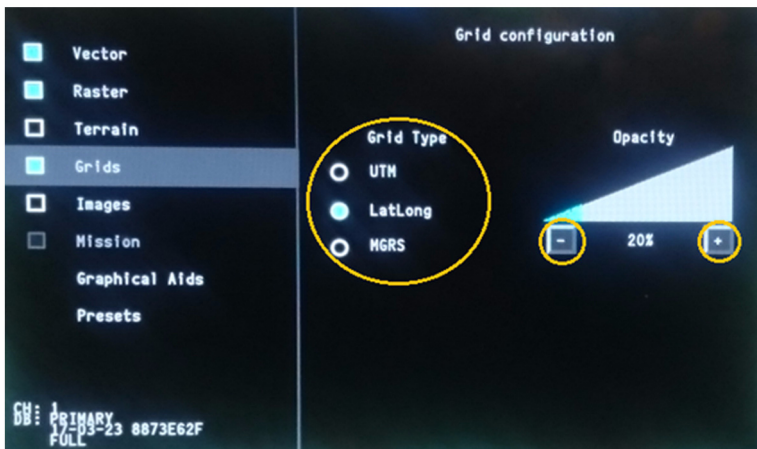
Figure 5-30 Latitude and Longitude Grids

HOW TO CHANGE THE GRID TYPE BY MFD

The Operator can select the Grid Type among the following values in the DMAP LAYERS CONTROL PANEL on MFD:

- UTM;
- LAT LONG;
- MGRS.

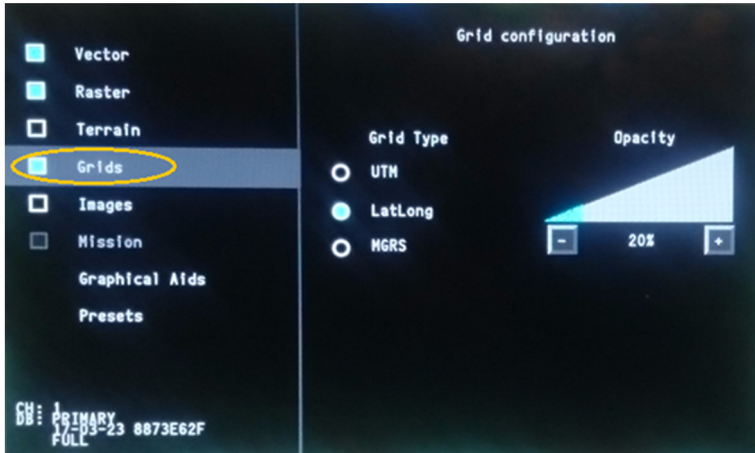
It is also possible to change Grid line opacity clicking on the '-' and '+' button.



189G4600X008-0144-01

Figure 5-31 GRID type change by MFD

It is possible to disable/enable the Grid Display pressing the check box highlighted in the next image. The default value is NO GRID.



189G4600X008-0145-01

Figure 5-32 GRID display activation by MFD

HOW TO ACTIVATE THE GRIDS DATA PRESENTATIONS BY MCDU

It is also possible to disable/enable the Grid Display pressing the GRIDS (LSK5L) on DMAPX LAYERS page on MCDU.



189G4600X008-0146-01

Figure 5-33 Grids activation/deactivation by MCDU

PREDICTED PATH

The predicted flight path function is providing the display of five points ahead of the aircraft corresponding to the predicted aircraft path over ground, calculated according to the instantaneous navigation data such as speed, track, roll, etc.

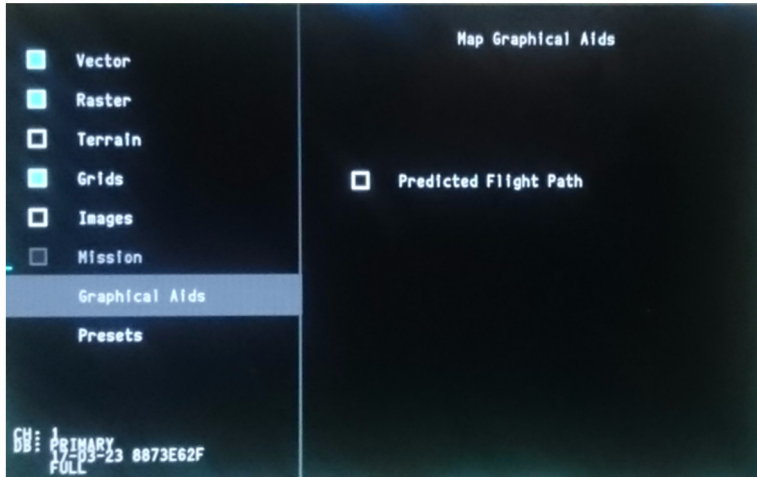
The time interval between two adjacent points can be defined via the MCDU page (i.e. DMAP AIDS Page); the default Prediction Interval Time is 5 seconds (i.e. corresponding to a total Predicted Path of 25 seconds).

The prediction is computed if ground speed is greater than 42 Knots and wind data is available. Attitude information must also be available for the computation.



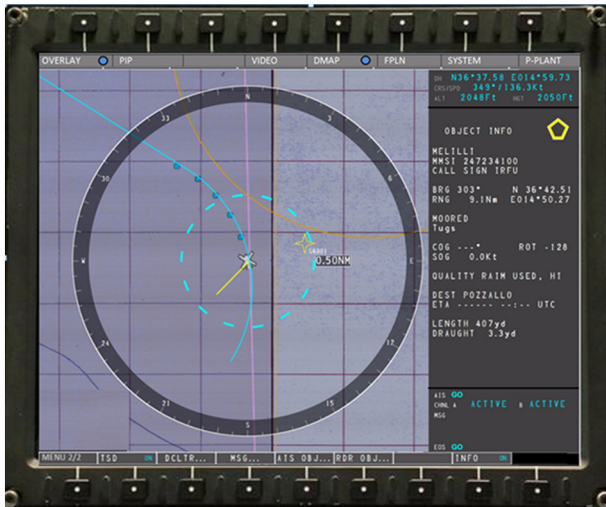
HOW TO ACTIVATE THE PREDICTED PATH BY MFD

The Operator can activate/de-activate the Predicted Path function through the Predicted Flight Path check box on the MFD DMAP LAYERS CONTROL PANEL in the Graphical Aids section; here below, a picture of the relevant panel:



189G4600X008-0147-01

Figure 5-34 PREDICTED PATH activation on the MFD DMAP LAYERS CONTROL PANEL



189G4600X008-0148-01

Figure 5-35 PREDICTED PATH by MFD control menu

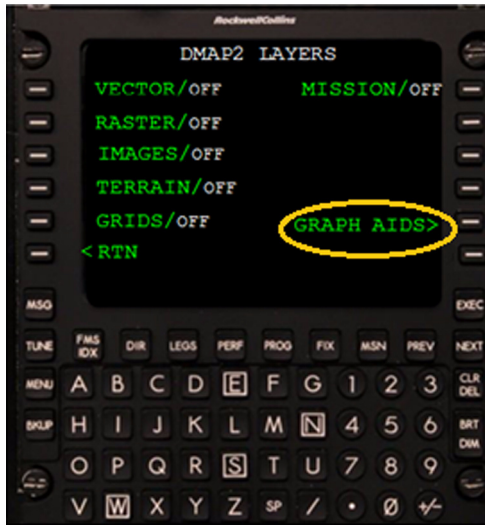
HOW TO DEFINE THE PREDICTED INTERVAL TIME BY MCDU

The Operator can modify the Predicted Interval time through the PRED PATH TIME INC (LSK4R) or DEC (LSK4L) Keys in the DMAPx AIDS page on MCDU.

The Operator can modify the value from 25 seconds to 60 seconds (with an incremental step equal to 5) corresponding to a complete path of five dots. The default value is 30 seconds.

Note

The Operator should always use the same Predicted Interval time to easily and unequivocally identify the predicted helicopter position according to the displayed dots.



189G4600X008-0149-01

Figure 5-36 PREDICTED INTERVAL Time definition by MCDU (1 of 2)



189G4600X008-0150-01

Figure 5-36 PREDICTED INTERVAL Time definition by MCDU (2 of 2)

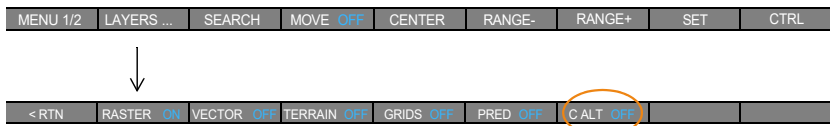
ALTITUDE AT CURSOR

The Altitude at Cursor function is providing the information of the terrain altitude on the position pointed by the cursor; the DMAP is using the Digital Terrain Elevation Data to provide the altitude value.

The altitude indication is presented either in feet or in meters according to the display settings.

HOW TO ACTIVATE THE ALTITUDE AT CURSOR PRESENTATION BY MFD CONTROL MENU

The Operator can activate/de-activate the Altitude at Cursor function through the C ALT ON/OFF button on the MFD DMAP LAYERS CONTROL MENU reachable pressing the LAYERS button as depicted in the following picture.



When Digital Terrain Elevation Data is available at the cursor pointed position, the label will be “Alt xxxxx ft” or “Alt xxxxx mt” according to the display units settings.

When Digital Terrain Elevation Data is not available at the cursor pointed position, the label will be “Alt -----”.



189G4600X008-0151-01

Figure 5-37 ALTITUDE AT CURSOR presentation by MFD control menu

PRESENTATION OF TERRAIN DATA

The DMG System supports terrain data such as DTED (Digital Terrain Elevation Data); further formats could be used after proper conversion performed by the ground station.

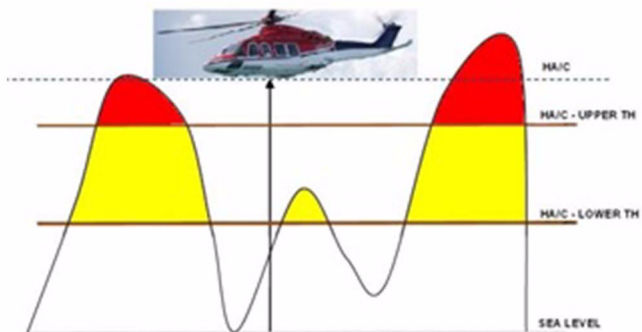
The DMG is able to manage the following Digital Terrain Elevation Data formats:

Product	Post spacing (arc-sec)	Post spacing (meters)	Rows/columns (1x1° tile)
DTED Level 0	30 arc-sec	approx. 1,000m	121/121
DTED Level 1	3 arc-sec	approx. 100m	1201/1201
DTED Level 2	1 arc-sec	approx. 30m	3601/3601

189G4600X008-0062-01

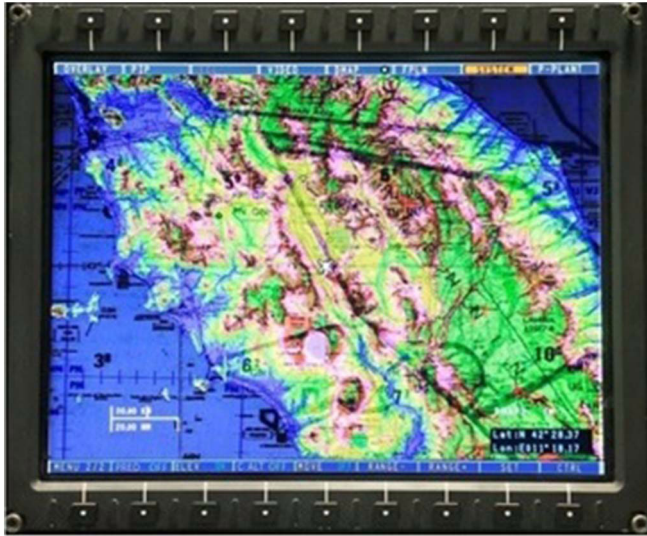
Figure 5-38 Digital Terrain Elevation Data formats

- **Elevation Banding:** the Elevation Banding function is meant to provide the pilot with a pseudo-3D representation of the terrain by shading map areas with different colours depending on their elevation.
- **Terrain Above Elevation:** the Terrain Above Elevation (TAE) function is meant to provide the Pilot with terrain awareness. Two thresholds are defined with respect to the aircraft altitude. Said HA/C the aircraft altitude, and UPPER TH and LOWER TH the two thresholds, the TAE function consists in the following (all the altitudes are above MSL):
 - Shading with RED colour map areas whose MSL elevation is higher than the aircraft altitude minus UPPER TH (e.g. $MSL = (HA/C - UPPER TH)$);
 - Shading with YELLOW colour map areas whose MSL elevation is greater than the aircraft altitude minus LOWER TH and lower than the aircraft altitude minus UPPER TH (e.g. $(HA/C - LOWER TH) = MSL = (HA/C - UPPER TH)$).



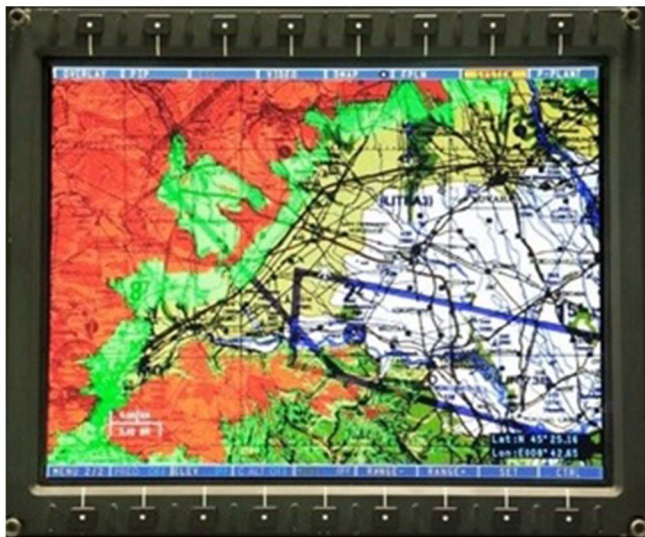
189G4600X008-0063-01

Figure 5-39 Terrain Above Elevation (TAE) function 1/3



189G4600X008-0064-01

Figure 5-40 Terrain Above Elevation (TAE) function 2/3



189G4600X008-0065-01

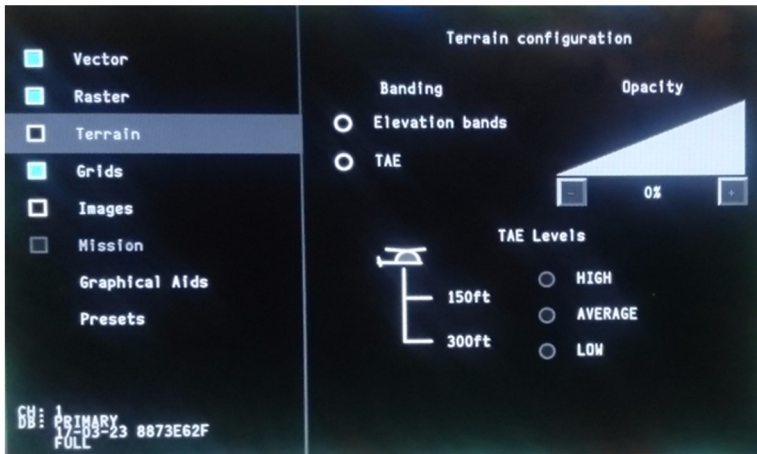
Figure 5-41 Terrain Above Elevation (TAE) function 3/3

In addition, the degree of transparency of terrain data can be modified. The TAE and Elevation Banding are mutually exclusive functions.

HOW TO ACTIVATE THE TERRAIN DATA PRESENTATION BY MFD CONTROL MENU

The Operator can activate/de-activate the Terrain Above Elevation (TAE) function through the TAE check box on the MFD DMAP LAYERS CONTROL PANEL in the TERRAIN section.

The Operator can activate/de-activate the Elevation Banding function through the Elevation bands check box on the MFD DMAP LAYERS CONTROL PANEL in the TERRAIN section; here below a picture of the panel:



189G4600X008-0152-01

Figure 5-42 TERRAIN DATA presentations by MFD control menu

HOW TO ACTIVATE THE TERRAIN DATA PRESENTATIONS BY MCDU

The Operator can activate/de-activate the Terrain layer display function through the TERRAIN (LSK3L) in the DMAPX LAYERS page on MCDU.



189G4600X008-0153-01

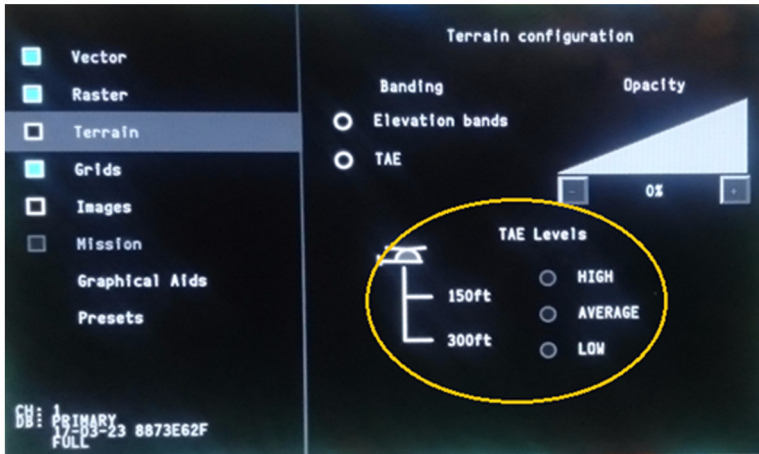
Figure 5-43 TERRAIN DATA presentations by MCDU

HOW TO MANAGE THE TAE THRESHOLDS BY MFD

In the DMAP LAYERS CONTROL PANEL on MFD, in the TERRAIN configuration section, it is possible to select among three TAE leves HIGH, AVERAGE and LOW., These thersholds matches the UPPER and LOWER thesholds that are reported in the following table:

TAE LEVEL	LOWER THRESHOLD	UPPER THRESHOLD
HIGH	300ft	150ft
AVERAGE	350ft	200ft
LOW	500ft	300ft

Thresholds are relative to the current altitude of the A/C and they are expressed in feet.

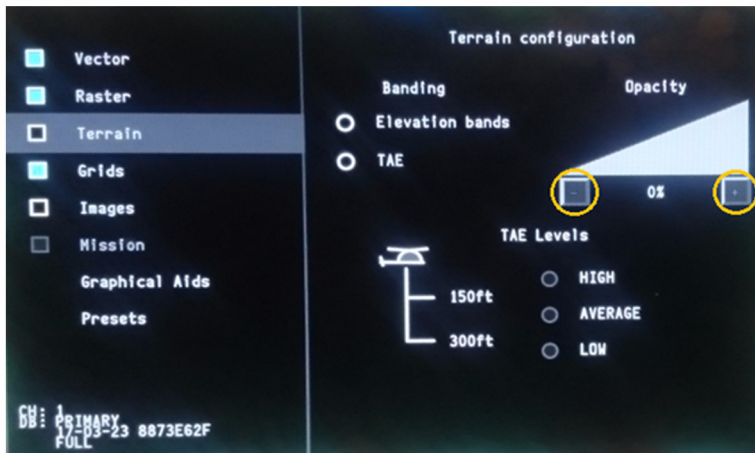


189G4600X008-0154-01

Figure 5-44 TAE Thresholds management by MFD

HOW TO CHANGE THE TERRAIN DATA TRANSPARENCY BY MFD

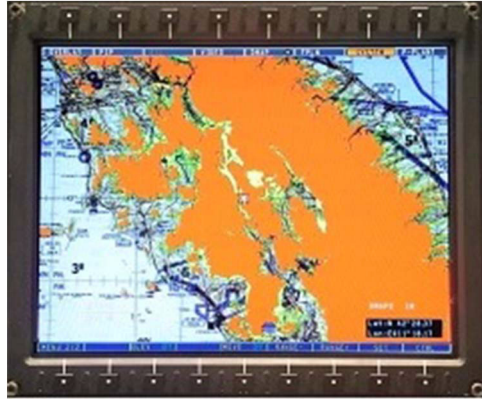
The degree of opacity of terrain data (for both TAE and Elevation Banding) can be modified.



189G4600X008-0155-01

Figure 5-45 TERRAIN DATA TRANSPARENCY change by MFD (1 of 3)

Pressing '-' or '+' Keys highlighted in the above picture the OPACITY will respectively decrease or increase in the range from 0% (TERRAIN DATA will be totally transparent) to 100%(TERRAIN DATA will be totally shaded).



189G4600X008-0070-01

Figure 5-45 TERRAIN DATA TRANSPARENCY change by MFD (2 of 3)



189G4600X008-0071-01

Figure 5-45 TERRAIN DATA TRANSPARENCY change by MFD (3 of 3)

MISSION LAYERS MANAGEMENT

Mission layers are generic vector files that may be copied to the flash drive of each AMMC, alongside the Digital Map Database, in order to provide mission specific information.

The operator shall be allowed copying the mission layer in order to provide mission specific information.

HOW TO COPY THE MISSION VECTORS FROM DTD TO USB BY MCDU

The COPY MISSION ON USB (LSK4R) on DMAPX DATABASE page on MCDU allows to access a page where the pilot can upload from DTD a Mission Vector in order to upgrade the Mission Vectors USB content. This function is available only on ground and when a valid PRIMARY DB is present.



189G4600X008-0156-01

Figure 5-46 MISSION VECTORS copy from DTD to USB by MCDU

The COPY STATUS (LSK5R) reports the copy status from DTD of a Mission Vector. Allowed values are:

- READY when the DTD copy is available;
- IN PROGRESS when the DTD Copy is in progress;
- SUCCESS when the DTD copy has ended successfully;
- FAILED when the DTD copy was not successful;
- NOT AVAIL when the DTD copy is not available (no PRIMARY DB available, not on ground, DTD not working or no Mission Vector present on the DTD).

On the DMAP COPY MSN ON USB page, a list of up to 10 mission vector names, each composed by the first 10 characters of the first 10 mission vector files available on the DTD for copy on the USB device, are provided.



189G4600X008-0157-01

Figure 5-47 DMAP COPY MSN ON USB page on MCDU

When one of the LSK relevant to the Mission Vector is selected, the file is uploaded from the DTD and copied on USB device, The DMAPx DATABASE page is then automatically returned.

[Functional limitation: The COPY MISSION ON USB is not working and for this reason the relevant page is not accessible (the COPY MISSION ON USB is displayed in amber colour and NOT AVAIL is displayed on the COPY STATUS (LSK5R)).]

HOW TO ACTIVATE THE MISSION VECTOR PRESENTATIONS BY MCDU

It is also possible to disable/enable the Mission Vectors Display pressing the MISSION (LSK1R) on DMAPX LAYERS page on MCDU.

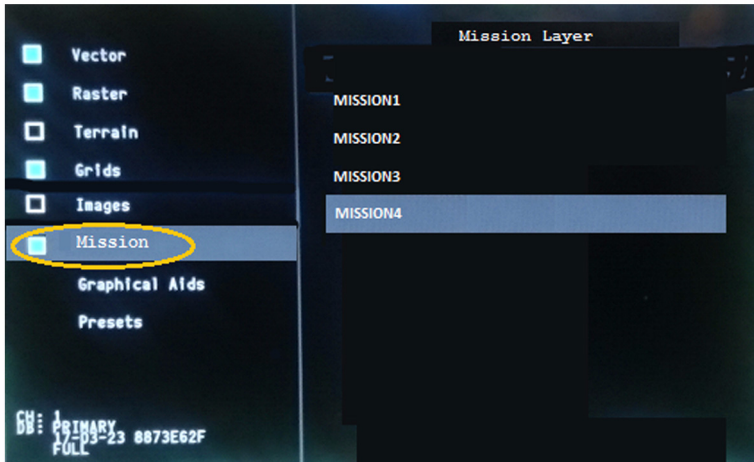


189G4600X008-0158-01

Figure 5-48 Mission vector activation/deactivation by MCDU

HOW TO MANAGE THE MISSION VECTORS TYPE BY MFD

It is possible to disable/enable the Mission Vectors Display pressing the check box highlighted in the next image. The default value is disabled.

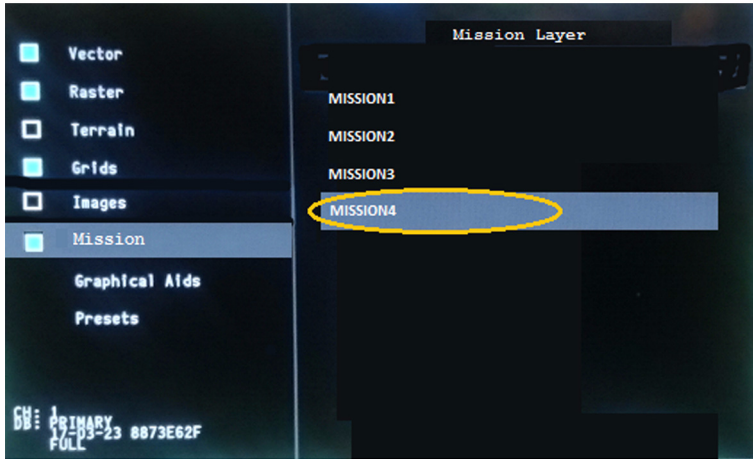


189G4600X008-0159-01

Figure 5-49 MISSION VECTORS type management by MFD (1 of 2)

The Mission Vector list is displayed in the right part of the Mission Layer DMAP LAYERS CONTROL PANEL.

It is possible to select for display a Mission Vector layer clicking on the desired one that, one selected, will be highlighted as in the next image. Selecting another Mission Vector has the effect of deselecting the current one and select the new one.



189G4600X008-0160-01

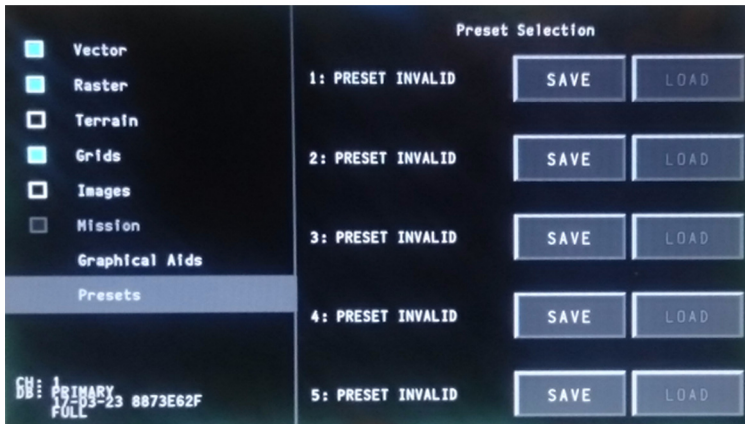
Figure 5-49 MISSION VECTORS type management by MFD (2 of 2)

PRESETS MANAGEMENT

The PRESETS management allows the operator to save and load DMAP settings, into up to five available presets. Presets are also saved into Non Volatile memory in order to be available at each system power-up.

HOW TO MANAGE THE PRESETS TYPE BY MFD

The PRESETS control can be performed in the DMAP LAYERS CONTROL PANEL. In case no PRESETS has been ever saved, the following picture is displayed.



189G4600X008-0161-01

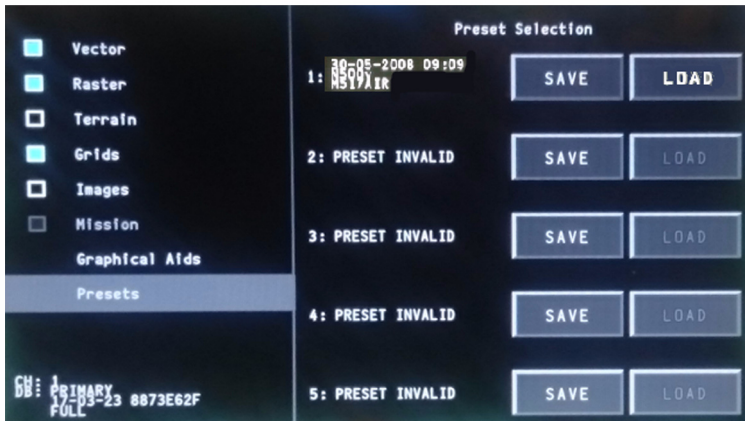
Figure 5-50 PRESETS type management by MFD (1 of 2)

Each of the SAVE buttons allows to save in the relevant PRESET (1 to 5), overwriting the possible already present one, the current DMAP configuration in terms of:

- date and time of the preset saving;
- database name;
- database date;

- current activation state of the dmap layers;
- current range step;
- current vector data set;
- activation state of the 16 vector levels for the current vector data set;
- current raster data set;
- terrain configuration:
 - elevation bands or TAE;
 - opacity of the terrain plane;
 - TAE preset.
- active Grid;
- active mission vector;
- predicted path.

Once saved, each of the five sections in the detail control panel shows the status of the preset, with a summary of the saving date, applicable range, configured layers as displayed in the next figure:



189G4600X008-0162-01

Figure 5-50 PRESETS type management by MFD (2 of 2)

The LOAD button allows to load the PRESET, discarding the current setting of the digital map channel in favor of the ones configured in the preset.

SEARCH MANAGEMENT

The SEARCH function allows performing basic searches among up to three search data sets.

HOW TO MANAGE THE SEARCH FUNCTION BY MFD

Pressing the “SEARCH” button on the DMAP MENU on MFD, a dedicated SEARCH CONTROL PANEL management is opened.



189G4600X008-0163-01

Figure 5-51 SEARCH function management by MFD (1 of 4)

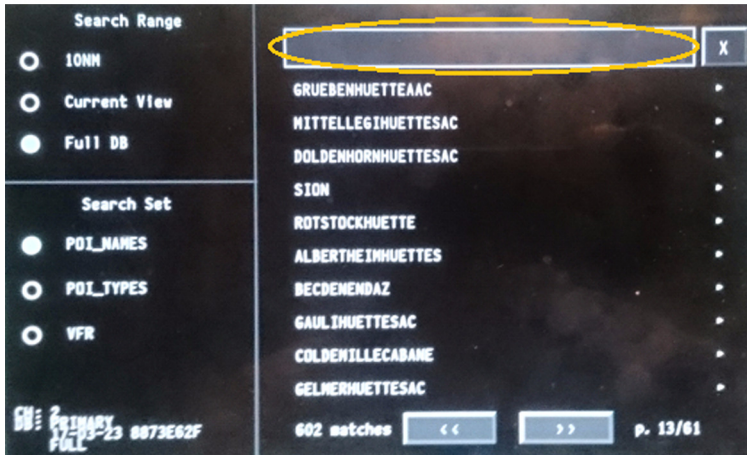
The SEARCH CONTROL PANEL can be hidden by selecting again the SEARCH button or by clicking with the CCD outside of the panel itself.

The "Search Range" section of the panel interface allows defining the scope of the search, limiting the range of search to a predefined value (10NM), to the currently displayed range or in the full data set.

The "Search Set" section of the panel interface allows selecting the Search Data Set on which the Search has to be performed.

The right portion of the panel is used to both enter the search string and to display and paginate the result list. Up to 1000 results are displayed. Clicking the "<<" and ">>" button in the bottom of the panel, allows browsing all the possible found results.

The search string can be entered in the text box on the top right and highlighted in the next figure, via the CCD rotary knob, positioning the cursor on it and pressing ENTER on the CCD.



189G4600X008-0164-01

Figure 5-51 SEARCH function management by MFD (2 of 4)

The CCD outer Knob is used to move back and forth in the search string, while the inner knob shall be used to select a particular character moving back and forth in the alphabet. The following characters are allowed:

capital letters **A B C D E F G H I J K L M N O P Q R S T U V W X Y Z**, space character and numbers.

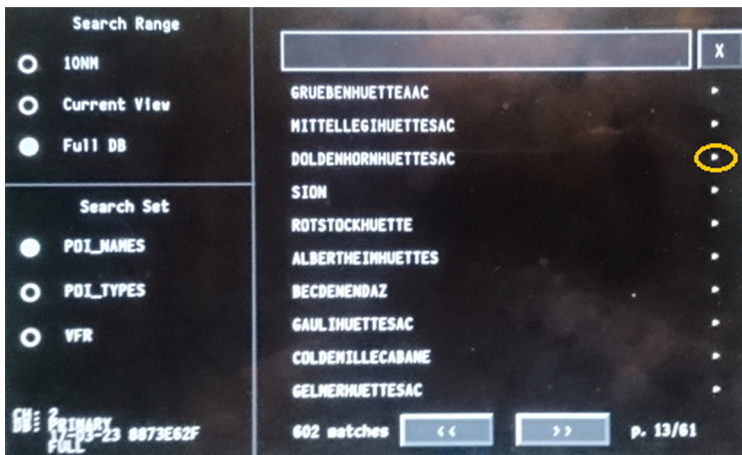
To delete a particular character the operator has to select the space character with the inner knob.

If no search string is specified, it means to search for all possible results without filtering in the current selected Search Range and Set.

If a Search String is specified, all results that exactly matches the Search String at the beginning of the string are presented.

If the "X" button on the right side of the text box is pressed, the possible inserted Search String is cleared.

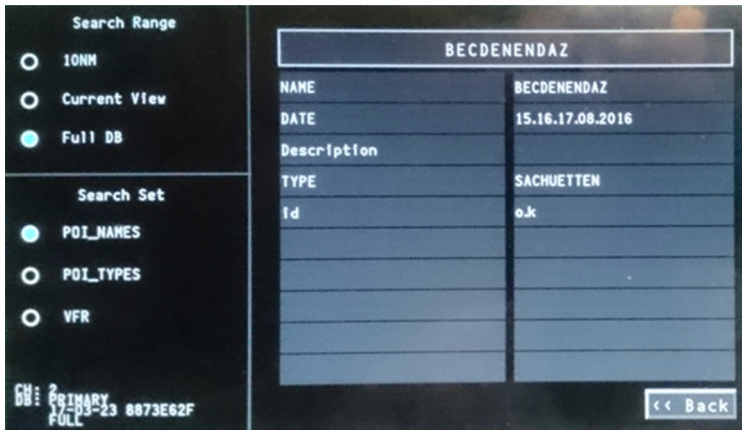
When the operator selects the arrow next to each match name as highlighted in the following figure, the DMAP shall hide the panel and center the map on that item position.



189G4600X008-0165-01

Figure 5-51 SEARCH function management by MFD (3 of 4)

When the operator selects a particular match name the DMAP shall display in the panel on the right the detailed information about the selected record. The back button shall be used to go back to the search result panel.



189G4600X008-0166-01

Figure 5-51 SEARCH function management by MFD (4 of 4)

Clicking the “<< Back” bitton in the bottom/left side of the Paneldisplay again the search result list.

HOW TO MANAGE THE SEARCH FUNCTION BY MCDU

The Search function is performed via MFD as detailed in the above paragraph. Once the SEARCH PANEL is open on MFD, MCDU provides a further interface to enter the Search String.

The MCDU Search page is reachable from DMAPx TOP Page pressing the SEARCH key (LSK2R).



189G4600X008-0167-01

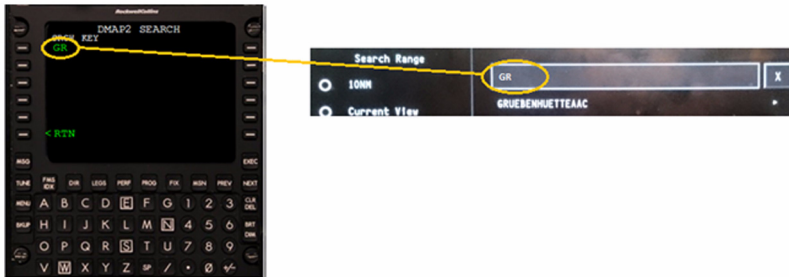
Figure 5-52 SEARCH function management by MCDU (1 of 3)



189G4600X008-0168-01

Figure 5-52 SEARCH function management by MCDU (2 of 3)

The Search Key can be inserted via the MCDU alphanumeric keyboard. Once the desired search string has been inserted in the scratchpad, when the Pilot presses the SRCH KEY key (LSK1L) on the DMAPx SEARCH page, the string automatically fills in the edit box on the MFD and the search is started.



189G4600X008-0169-01

Figure 5-52 SEARCH function management by MCDU (3 of 3)

The SEARCH key in DMAP TOP page and SRCH KEY in DMAPx SEARCH page are not enabled and displayed in amber colour if:

- Neither PRIMARY DB nor BACKUP DB are available
- the DMAP channel is underlaid in Flight Plan page
- the SEARCH PANEL relevant to DMAP Channel is not open on MFD
- no SEARCH DATA SET are present in the active DB (PRIMARY or BACKUP).

SECTION VI

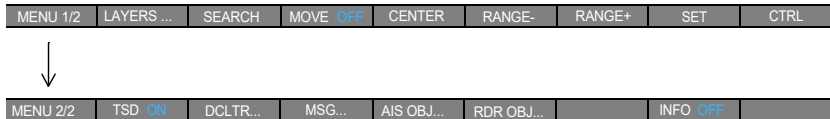
MISSION MANAGEMENT FUNCTIONS

When the helicopter configuration provides the SAR Option equal to either "SAR LAYERS" or "SAR FULL", additional Mission Management functionalities are provided; the availability of each specific MM function is subjected to the associated Option as reported below:

- Tactical Situation Display graphical representation and interactions (Option: SAR equal to "SAR LAYERS" or "SAR FULL")
- AIS Management (Option: AIS NAVAL XPDR equal to "INST")
- Radar Management (Option: RADAR equal to "RDR-1500B+")
- EOS Management (Option: FLIR equal to "SS380HD").

The Mission Management functionalities are available via MCDUs, CCDs and MFDs.

When the Mission Management functionalities are provided (i.e. Option "SAR LAYERS" or "SAR FULL"), the following sub-menu (i.e. MENU 2/2) is available:



TACTICAL SITUATION DISPLAY

The Tactical Situation Display is a graphical representation layer of the tactical items and graphical aids managed by the MM.

The Tactical Situation Display, will present, according to the helicopter configuration and relevant Options, AIS objects, Radar tracks, EOS graphical aids such as Field of View and Line of Sight.

The TSD can be displayed with or without the alphanumeric Information area (hereafter called "minitote") on the right side of the screen.

The following interactions can be performed on the TSD:

- Activate or de-activate the visualization of the graphical representation layer;
- Activate or de-activate the the INFO Area presentation;
- Center the TSD on the CCD position;
- Create FMS Waypoints.

Note

The interactions with Radar, AIS and EOS will be described into the relevant sections.

An example of TSD graphical view with INFO area displayed is reported below where AIS objects and Radar tracks are presented:



189G4600X008-0170-01

Figure 6-1 TSD graphical view with INFO area displayed (example)

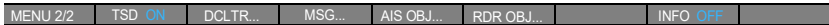
HOW TO ACTIVATE THE TSD PRESENTATIONS BY MFD CONTROL MENU

The Pilot can activate/de-activate the Tactical Situation Display (TSD) presentation layer through the TSD ON/OFF button on the MFD DMAP CONTROL MENU 2/2.



HOW TO ACTIVATE THE INFO AREA PRESENTATIONS BY MFD CONTROL MENU

The Pilot can activate/de-activate the INFO Area presentation through the INFO ON/OFF button on the MFD DMAP CONTROL MENU 2/2.



HOW TO CENTER THE TSD PRESENTATION BY CCD

The Pilot can center the TSD presentation through the CCD with the following steps:

- position the cursor on the map;
- push the CCD inner knob or pull the lateral chinese key to display the following pop-up menu:



- move the cursor on top of the “ORIGIN” label and push either the CCD inner knob or pull the lateral chinese key.

Note

The above pop-up menu is displayed when there is not a selected tactical item under the cursor.

Pressing the ESC button of the CCD the move is deselected and the presentation centered on the helicopter position.

HOW TO CREATE AN FMS WAYPOINT ON THE TSD BY CCD

The Pilot can create an FMS User Waypoint (i.e. fixed position) on the TSD through the CCD with the following steps:

- position the cursor on the map;
- push the CCD inner knob or pull the lateral chinese key to display the following pop-up menu:



- move the cursor on top of the "CREATE MWPT" label and push either the CCD inner knob or pull the lateral chinese key.

Note

The above pop-up menu is displayed when there is not a selected tactical item under the cursor.

Once the FMS User Waypoint has been created, the WPT symbol will be displayed or not according to the overlay settings (i.e. OFF ROUTE) with the name equal to "MWPTxx" (where xx is an incremental number starting from 01).

AIS MANAGEMENT

According to the helicopter configuration, when the Option AIS NAVAL XPDR is equal to "INST", the Mission functionalities includes the management of the following Automatic Identification System functions:

- AIS Status display on Minitote
- preset and control through the MCDUs
- Search an AIS Object for DMG centering and/or FMS Waypoint creation
- AIS Objects display on TSD and Summary Table
- Messages exchange
- Interrogation
- Creation of an FMS Waypoint (i.e. SEND FMS) from the selected AIS Object
- Pointing the EOS on the position of the selected AIS Object
- Mark and Unmark the AIS Object to avoid automatic deletion.

AIS STATUS DISPLAY ON MINITOTE

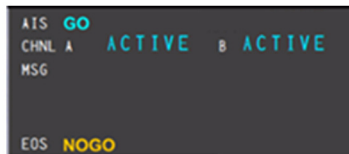
The AIS status is displayed on the last part of the Minitote area as described below.

The AIS Minitote provides the display of the following AIS status information:

- AIS Status among:
 - "GO" (i.e. no malfunctions are present)
 - "DEGRADED" (i.e. minor malfunctions are present; some limitations could be encountered, e.g. single channel operations)
 - "NOGO" (i.e. major malfunctions are present preventing the AIS operations).
- Transmission Mode Channel A & B among:
 - "ACTIVE" (i.e. automatic transmission)
 - "COM ACT" (COMManded ACTive, i.e. transmission will take place only following operator actions such as "Interrogate" or Send AIS Messages)
 - "SILENT" (i.e. no transmission)
 - "FAILURE" (i.e. the channel is in failure).
- Message transmission status among:
 - "SENDING..." during AIS message transmission

- "NOT SENT" for 5 seconds, when the last message has not been positively sent/acknowledged
- "SENT" for 5 seconds, when the last message has been positively sent/acknowledged
- Blank otherwise.

An example of the AIS Minitote is provided below.

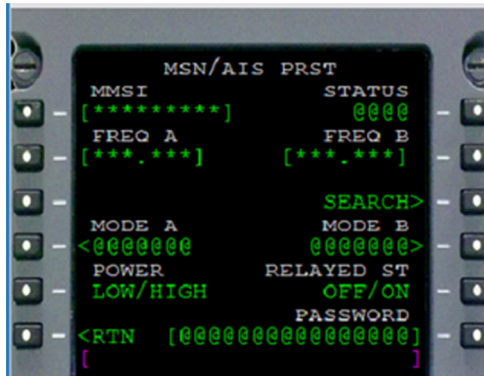


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Figure 6-2 AIS Minitote (example)

AIS PRESET AND CONTROL BY MCDUS

Pressing the MSN SMK and then the "<AIS PRST" Key (LSK2L), the following MCDU page is displayed allowing the Pilot to access the main AIS functions:



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Figure 6-3 Main AIS functions on MCDU page

The AIS Configuration could be password protected; the configuration changes are allowed within 10 seconds when the AIS is in logged in status:

- Insert the correct password (LSK6R) (up to 16 alphanumerical characters), press ENTER;
- Wait Login successfully result (i.e. the entered fields disappear);
- Execute the configuration parameters changes during 10 sec;
- When the 10 seconds have elapsed a new login is required in order to continue configuration changes.

The MCDU provides the display of the AIS Status (LSK1R) among:

- “GO” (i.e. no malfunctions are present)
- “DEGRADED” (i.e. minor malfunctions are present; some limitations could be encountered, e.g. single channel operations)
- “NOGO” (i.e. major malfunctions are present preventing the AIS operations).

The MCDU allows the modification of the following parameters:

- **Maritime Mobile Service Identity (MMSI, LSK1L):** the accepted value is in the range 0....999999999. If “0” is inserted, the MMSI is considered as invalid. The MMSI is stored into the AIS Non Volatile Memory for next power-on retrieval.
- **Frequency Channel A and Frequency Channel B (LSK2L and LSK2R):** the accepted value is in the range 155.000....163.000; the entered value will be rounded to the 25 KHz step. The Frequencies are stored into the AIS Non Volatile Memory for next power-on retrieval.
- **Transmission Mode A and Transmission Mode B (LSK4L and LSK4R):** the available options are SILENT (i.e. no transmission), ACTIVE (i.e. automatic transmission) and COM ACT (COMmanded ACTive, i.e. transmission will take place only following operator actions such as “Interrogate” or Send AIS Messages). The Transmission Modes are stored into the AIS Non Volatile Memory for next power-on retrieval.
- **Output Power (LSK5L):** the available options are Low (1 W) and High (12.5 W). The Output Power is stored into the AIS Non Volatile Memory for next power-on retrieval.
- **Relayed Station (LSK5R):** the available options are OFF (i.e. the relayed AIS Objects, such as NAV AID and BASE STATION far away from the current helicopter position, are not retrieved and stored into the AIS DB) and ON (i.e. the relayed AIS Objects are included in the AIS DB). The default is OFF.






The MCDU allows to enter and select the AIS SEARCH function (see “How to Search an AIS Object by MCDU” paragraph).

AIS OBJECTS DISPLAY ON TSD

A maximum number of 200 AIS Objects nearest to the helicopter position can be stored into AIS Object Database.

Only the nearest up to 100 AIS Objects will be displayed on TSD.

The following types of AIS Objects are graphically displayed on the TSD:

-  NAV AID, Aids to Navigation: Lighthouses, buoys, markers of special dangers or other aids to navigation;
-  BASE STATION, AIS Base station (shore based);
-  CLASS A SHIP, Shipborne Class A transponder (SOLAS ship);
-  CLASS B SHIP, Shipborne Class B transponder (non-SOLAS ship);
-  SAR, Search-and-rescue aircraft or other airborne AIS transponder.

The AIS objects are automatically created based on the information received by the AIS; the AIS Object are automatically deleted after 7 minutes since last update if not marked (i.e. an AIS Object can be Marked to avoid automatic deletion).

Any AIS Object is uniquely identified by its MMSI Number.

Each AIS object is identified by means two labels: on the bottom left there is either the MMSI number or the Waypoint name (i.e. when the AIS object has been used to create an FMS Waypoint) while on the top right the AIS object name (i.e. the Vessel name).

The AIS INFO area, when displayed, provides the following AIS Object information according to the AIS Object type:

	SHIP A Class	SHIP B Class	SAR	NAV AID	BASE STATION
Object symbol	X	X	X	X	X
Vessel Name	X	X	N/A	N/A	N/A
MMSI	X	X	X	X	X
Call Sign	X	N/A	N/A	N/A	N/A
Position	X	X	X	X	X
Position Accuracy	X	X	N/A	N/A	N/A
RAIM	X	X	X	N/A	N/A
Speed Over Ground	X	X	X	N/A	N/A
Course Over Ground	X	X	X	N/A	N/A
Navigational Status	X	N/A	N/A	N/A	N/A
Rate Of Turn	X	N/A	N/A	N/A	N/A
Altitude	N/A	N/A	X	N/A	N/A
Ship Type	X	X	N/A	N/A	N/A
Estimated Time Arrival	X	N/A	N/A	N/A	N/A
Destination	X	N/A	N/A	N/A	N/A
Length	X	X	N/A	N/A	N/A
Draught	X	N/A	N/A	N/A	N/A

The following interactions are available on the AIS Objects TSD:

- a. Select, via the CCD, an AIS Object to display detailed information on the minitote;
- b. Create an FMS Waypoint (i.e. SEND FMS) from the selected AIS Object;
- c. Send an AIS Message to the selected AIS Object;
- d. Interrogate the selected AIS Object;
- e. Point the EOS on the current position of the selected AIS Object;
- f. Declutter (i.e. filter on display) the AIS Objects presentation;
- g. Mark and Unmark an AIS Object to avoid automatic deletion.

An example of TSD graphical view with INFO area displayed reporting AIS Ship Class A information is provided below:



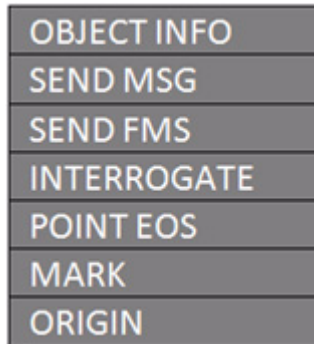
189G4600X008-0173-01

Figure 6-4 TSD graphical view with INFO area displayed (example)

How to select an AIS Object by CCD

The Pilot can select an AIS Object on the TSD and display the associated minitote, with the following steps:

- position the cursor on top of the corresponding symbol;
- push the CCD inner knob or pull the lateral chinese key to display the following pop-up menu:



- move the cursor on top of the “OBJECT INFO” label and push either the CCD inner knob or pull the lateral chinese key.

Note

The “POINT EOS” label is displayed or not according to the helicopter configuration (i.e. Option: FLIR equal to “SS380HD”).

As soon as the AIS Object is selected, the symbol is highlighted as follow and the associated information details are displayed on the minitote.



Note

When the cursor is positioned on top of two or three symbols, a selection pop-up menu is presented to provide the Pilot the capability to select the AIS Object of interest; an example of the selection pop-up menu is provided below:

234875000
442487500
924855960

Note

When the cursor is positioned on top of more than three symbols, a clutter pop-up menu is presented; the Pilot should zoom in to remove display congestion; an example of the clutter pop-up menu is provided below:

CLUTTER

AIS OBJECTS DISPLAY ON SUMMARY TABLE

The AIS Objects can also be displayed on alphanumerical tabular form (i.e. in so called "Summary Table") as described below.

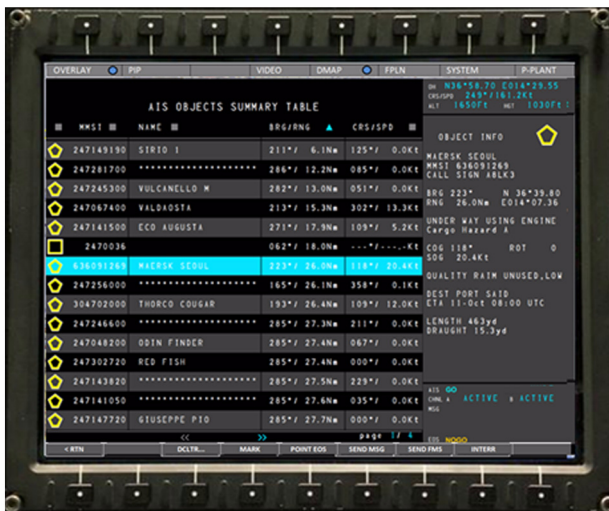
The following interactions are available on the AIS Objects Summary table:

- a. Order ascending/descending the Summary Table content according to the following parameters:
 - AIS Type (order: SHIP A, SHIP B, SAR, BASE STATION, NAV AID);
 - MMSI Number;
 - SHIP Name;
 - Range;
 - Course angle (i.e. used for training purposes).
- b. Browse the Summary Table content;
- c. Select, via the CCD, an AIS Object to display detailed information on the minitote;
- d. Create an FMS Waypoint (i.e. SEND FMS) from the selected AIS Object;
- e. Send an AIS Message to the selected AIS Object;

- f. Interrogate the selected AIS Object;
- g. Point the EOS on the current position of the selected AIS Object;
- h. Declutter (i.e. filter on display) the AIS Objects presentation;
- i. Mark and Unmark an AIS Object to avoid automatic deletion.

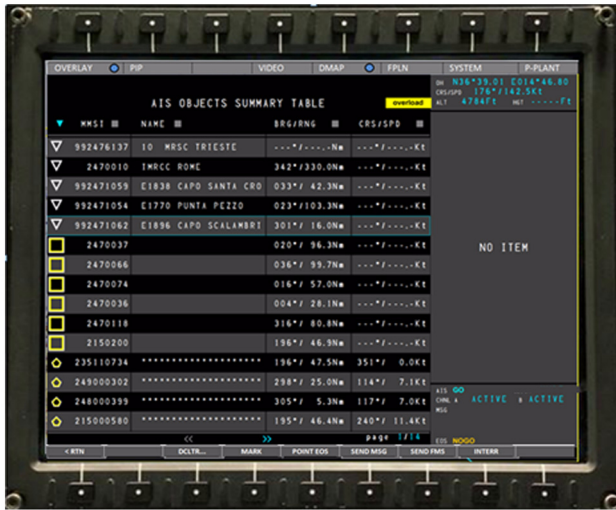
When the AIS Object database is near to be filled up, the following caption, in yellow, is displayed next to the Summary Table title: "OVERLOAD -X" (where X ranges from 5 to 1) or "OVERLOAD".

Examples of AIS Objects Summary Tables are provided below:



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Figure 6-5 AIS Objects Summary Tables (example) (1 of 2)

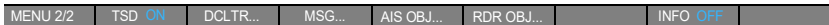


189G4600X008-0175-01

Figure 6-5 AIS Objects Summary Tables (example) (2 of 2)

How to activate the AIS Objects Summary Table by MFD CONTROL MENU



The Pilot can activate/de-activate the AIS Objects Summary Table presentation through the AIS OBJ ... button on the MFD DMAP CONTROL MENU 2/2.



Activating the AIS Objects Summary Table presentation, the following MFD DMAP CONTROL MENU is displayed:



How to order the AIS Objects Summary Table by CCD

The Pilot can order (ascending/descending) the AIS Objects Summary Table presentation placing the CCD on top of the square (i.e. ) or triangle (i.e. ) symbol on the header line.

An example of the AIS Objects Summary Table ordered by ascending range from the helicopter position is provided below:



MMSI	NAME	BRG/RNG	CRS/SPD
------	------	---------	---------

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Figure 6-6 AIS Objects Summary Table (example)

How to browse the AIS Objects Summary Table by CCD

Each page can display up to 15 AIS Objects; when more than 15 AIS Objects are present, adjacent pages can be selected using the outer knob of the CCD.

The Pilot can browse adjacent AIS Objects Summary Table pages by turning clockwise and counterclockwise the outer knob of the CCD.

How to select an AIS Object by CCD

The Pilot can select an AIS Object on the Summary Table by placing the cursor on top of the corresponding row and pushing the inner button of the CCD rotary knob.

As soon as the AIS Object is selected, the row is highlighted in cyan and the associated information details are displayed on the minitote.

AIS OBJECTS INTERACTIONS

The following interactions are available on the AIS Objects:

- a. Create an FMS Waypoint (i.e. SEND FMS) from the selected AIS Object;
- b. Interrogate the selected AIS Object;
- c. Point the EOS on the current position of the selected AIS Object;
- d. Declutter (i.e. filter on display) the AIS Objects presentation (both on TSD and Summary Table);
- e. Send an AIS Message to the selected AIS Object;
- f. Mark and Unmark an AIS Object to avoid automatic deletion;
- g. Search an AIS Object for DMG centering and/or FMS Waypoint creation.

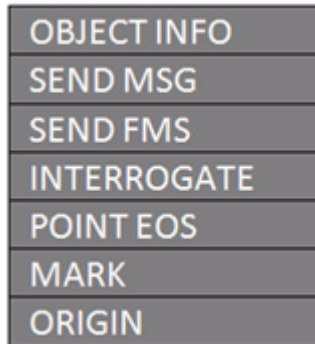
Note

The EOS functions are available when the Option FLIR is equal to "SS380HD".

How to create an FMS Waypoint from an AIS Object by CCD and MFD

The Pilot can create an FMS Waypoint from the selected AIS Object; the creation can be performed on:

- the TSD presentation through the CCD selecting the SEND FMS label of the pop-up menu:



- the Summary Table presentation through the MFD selecting the SEND FMS label of the DMAP CONTROL MENU:



The creation of a new FMS Waypoint has the following rules:

- If the selected AIS Object is either a Ship Class A or Ship Class B or a SAR (usually an helicopter), the created FMS item will be a Moving Waypoint. Note that the created Moving Waypoint is periodically updated according to the motion of the associated Mission item until deleted.
- If the selected AIS Object is a Nav Aid or a Beacon, the created FMS item will be a User Waypoint (i.e. a fixed Waypoint);

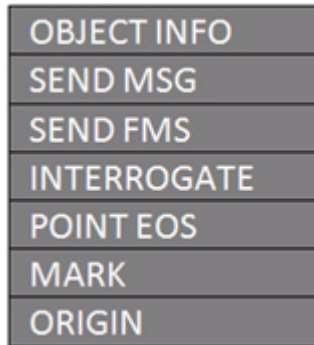
Once the FMS Waypoint has been created, the MMSI number near the AIS object symbol is replaced by the Waypoint name (i.e. MMOVxx, where xx is an incremental number from 01 or MWPTxx) and the SEND FMS is inactive for that AIS object.

The SEND FMS key on DMAP CONTROL MENU is displayed inactive when there is not a selected AIS Object.

How to interrogate an AIS Object by CCD and MFD

The Pilot can interrogate the selected AIS Object in order to get refreshed data; the interrogation can be performed on:

- the TSD presentation through the CCD selecting the INTERROGATE label of the pop-up menu:



- the Summary Table presentation through the MFD selecting the INTERR label of the DMAP CONTROL MENU:

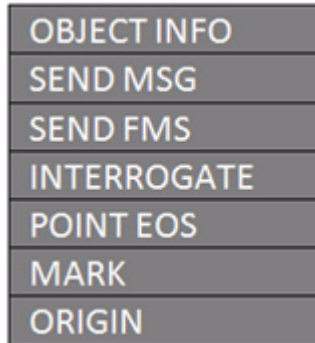


The INTERR key is displayed inactive when there is not a selected AIS Object or the interrogation is not possible due to the AIS equipment status.

How to point the EOS on an AIS Object by CCD and MFD

The Pilot can point the EOS on the position of the selected AIS Object; the pointing can be performed on:

- the TSD presentation through the CCD selecting the POINT EOS label of the pop-up menu:



- the Summary Table presentation through the MFD selecting the POINT EOS label of the DMAP CONTROL MENU:



Note that the EOS is pointed on the AIS position at the activation time (i.e. one shot pointing).

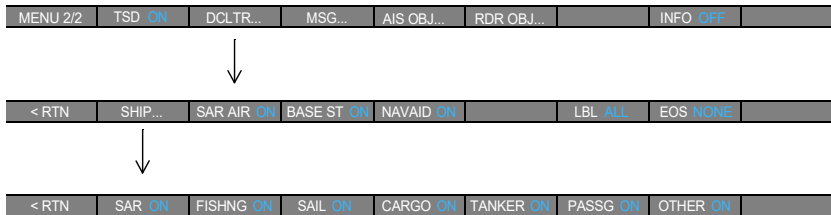
The POINT EOS key is displayed inactive when there is not a selected AIS Object or the EOS pointing is not possible due to the EOS equipment status.

How to declutter the AIS Objects by MFD CONTROL MENU

The Pilot can declutter the display of the AIS Objects, both on the TSD and on the Summary Table through the DCLTR... button on the MFD DMAP CONTROL MENU 2/2.

Pressing the DCLTR... button, the MFD DMAP DECLUTTER MENU as reported below is selected; on this menu, the Pilot can select:

- the SHIP Declutter menu for further decluttering
- the display (i.e. ON) or the remove (i.e. OFF) the SAR AIS Objects
- the display (i.e. ON) or the remove (i.e. OFF) the BASE STATION AIS Objects
- the display (i.e. ON) or the remove (i.e. OFF) the NAV AID AIS Objects
- the AIS Label display among NONE (i.e. no label), NAME (i.e. the Vessel Name) and ALL (both labels, the Vessel Name and either the MMSI or the FMS Waypoint Name)



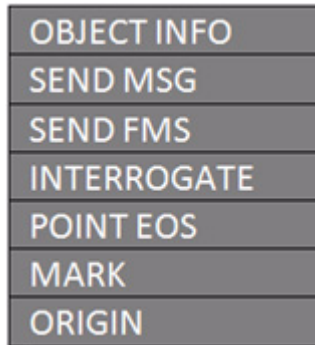
Pressing the SHIP... button, the MFD DMAP SHIP MENU as reported above is selected; on this menu, the Pilot can select:

- the display (i.e. ON) or the remove (i.e. OFF) the SAR Vessels
- the display (i.e. ON) or the remove (i.e. OFF) the Fishing Vessels
- the display (i.e. ON) or the remove (i.e. OFF) the Sailing Vessels
- the display (i.e. ON) or the remove (i.e. OFF) the Cargo Vessels
- the display (i.e. ON) or the remove (i.e. OFF) the Tanker Vessels
- the display (i.e. ON) or the remove (i.e. OFF) the Passengers Vessels
- the display (i.e. ON) or the remove (i.e. OFF) the other Vessels such as Tugs, Pilot Vessel, Medical Transport and others.

How to Mark and Unmark an AIS Object by CCD and MFD

The Pilot can Mark and Unmark an AIS Object to respectively avoid or allow the automatic deletion upon timeout expiration (i.e. 7 minutes have elapsed since last update); the selection can be performed on:

- the TSD presentation through the CCD selecting the MARK label of the pop-up menu:



- the Summary Table presentation through the MFD selecting the MARK label of the DMAP CONTROL MENU:



Note

The MARK label is replaced by the UNMARK label when an AIS Object already marked is selected.

The MARK key is displayed inactive when there is not a selected AIS Object. When an AIS Object is marked, its symbol is modified by adding a red square around it; e.g.



How to Search an AIS Object by MCDU

The Pilot can search and select an AIS Object by means of the MCDU in order to center the DMG presentation on it and to create an FMS Waypoint.

Pressing the MSN SMK and then the "<AIS PRST" Key (LSK2L) and then the "SEARCH>" (LSKR3R), the following MCDU page is displayed allowing the Pilot to access the Search function:



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Figure 6-7 AIS SEARCH page on MCDU

The search can be made by either inserting the MMSI or the Call Sign or the Name; a partial entry is accepted as initial portion of the entered string.

If the entered string does not match an existing AIS Object, the "NO RESULTS" error message will be displayed on the MCDU scratchpad.

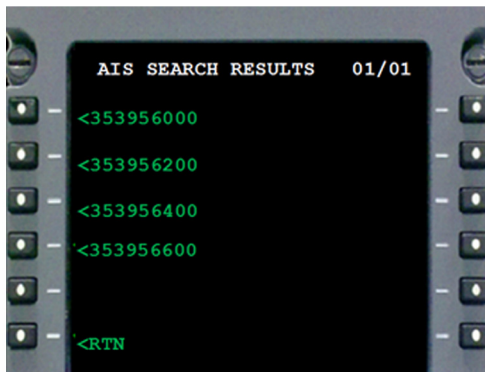
Up to 20 AIS Objects can be found matching the entered string.

If the entered string matches more than 20 AIS Objects, the "TOO MANY RESULTS" notification message will be displayed on the MCDU scratchpad.

If the entered string matches more than one AIS Object and less than 20, the "MORE RESULTS AVAIL" notification message will be displayed on the MCDU scratchpad.

The identifiers (either the MMSI or the Call Sign or the Name) will be displayed on the AIS SEARCH RESULTS pages (up to four pages) and the first one will be automatically selected on the AIS SEARCH page. The Pilot can select a different AIS Object by pressing the relevant key on the AIS SEARCH RESULTS page.

An example of the AIS SEARCH RESULTS page is displayed below (i.e. an AIS Object with MMSI matching the "353956" partial string has been entered):



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Figure 6-8 AIS SEARCH RESULT page on MCDU

The Pilot can create an FMS Waypoint from the selected AIS Object; by pushing the "SEND FMS" Key (LSK4R); same rules as described into the "How to create an FMS Waypoint from an AIS Object by CCD and MFD" paragraph above will apply.

The Pilot can center the DMG presentation on the selected AIS Object; by pushing the "CENTER DMAP1" Key (LSK5R) or the "CENTER DMAP2" Key (LSK6R). The "CENTER DMAP" Keys will be available only if the relevant DMAP will be displayed as DMAP format page only.

AIS MESSAGES MANAGEMENT

The Mission Management functions provide the capability to manage the transmission and reception of both AIS Free Text and Safety Related Messages. The following databases are managed:

- up to 20 Preset Messages loaded from Data Transfer Device and stored in Non Volatile Memory
- up to 100 Inbox (received) Messages
- up to 100 Outbox (transmitted) Messages.

The following interactions are available on the AIS Messages:

- a. Select the AIS Messages Summary Tables (either the Inbox, Outbox and Preset)
- b. Order ascending/descending the Summary Table content according to the following parameters:
 - Message Index
 - Message Description (i.e. alphabetical order)
 - Sender or Destination Address
 - Reception/Transmission Time
- c. Browse the Summary Table content
- d. Receive and display an AIS Message
- e. Forward, reply and delete a received AIS Message
- f. Forward and delete a transmitted AIS Message
- g. Edit, save and send an AIS Message.

How to activate the AIS Message Summary Tables by MFD CONTROL MENU

The Pilot can activate/de-activate the AIS Message Summary Table presentation through the MSG ... button on the MFD DMAP CONTROL MENU 2/2.

MENU 2/2	TSD ON	DCLTR...	MSG...	AIS OBJ...	RDR OBJ...		INFO OFF	
----------	--------	----------	--------	------------	------------	--	----------	--

Activating the AIS Messages Summary Table presentation, the INBOX Summary Table and the following MFD DMAP MESSAGE MENU is displayed:

MENU 2/2	TSD ON	DCLTR...	MSG...	AIS OBJ...	RDR OBJ...		INFO OFF	
----------	--------	----------	--------	------------	------------	--	----------	--



< RTN	SEL INBOX	NEWMSG	REPLY	FORWARD	SAVE	SEND	DELETE	
-------	-----------	--------	-------	---------	------	------	--------	--

The Pilot can activate/de-activate the OUTBOX and PRESET Summary Table presentation through the SEL button on the MFD DMAP MESSAGE MENU.

< RTN	SEL INBOX	NEWMSG	REPLY	FORWARD	SAVE	SEND	DELETE	
-------	-----------	--------	-------	---------	------	------	--------	--





< RTN	SEL OUTBOX	NEWMSG	REPLY	FORWARD	SAVE	SEND	DELETE	
-------	------------	--------	-------	---------	------	------	--------	--

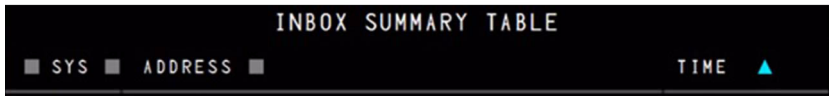





< RTN	SEL PRESET	NEWMSG	REPLY	FORWARD	SAVE	SEND	DELETE	
-------	------------	--------	-------	---------	------	------	--------	--

How to order the AIS Messages Summary Tables by CCD

The Pilot can order (ascending/descending) the AIS Messages Summary Table presentations placing the CCD on top of the square (i.e. ) or triangle (i.e. ) symbol on the header line.

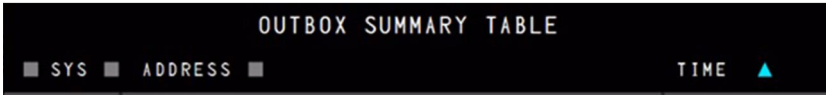
Examples of the AIS Messages Summary Tables ordered by time and by Index are provided below:



 SYS 	ADDRESS 	TIME 
-------------------------------------------------------------------------------------------------------------------------------------------------------------------------	-------------------------------------------------------------------------------------------	----------------------------------------------------------------------------------------

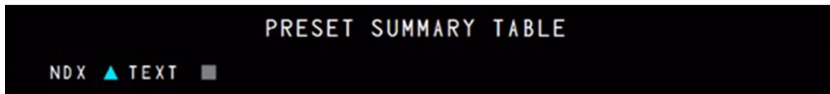
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Figure 6-9 Inboxes Summary Table by CCD



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Figure 6-10 Outbox Summary Table by CCD



189G4600X008-0082-01

Figure 6-11 Preset Summary Table by CCD**How to browse the AIS Messages Summary Table by CCD**

Each page can display up to 15 AIS Messages; when more than 15 AIS Messages are present, adjacent pages can be selected using the outer knob of the CCD.

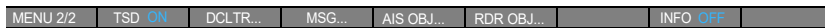
The Pilot can browse adjacent AIS Messages Summary Table pages by turning clockwise and counterclockwise the outer knob of the CCD.

How to display a received AIS Message by MFD CONTROL MENU

When a new message is received by the on board AIS (either sent in broadcast or to the own MMSI), the icon on the top left of the map area is displayed as depicted in the following figure (note that this is a non selectable icon):




The Pilot can activate the AIS INBOX Message Summary Table presentation through the MSG ... button on the MFD DMAP CONTROL MENU 2/2.



The Pilot can select an AIS Message on the Summary Table by placing the cursor on top of the corresponding row and pushing the inner button of the CCD rotary knob.

As soon as the AIS Message is selected, the row is highlighted in cyan and the associated information details are displayed on the minitote.

The following fields are displayed on the AIS Message Minitote:

- Message Date & Time
- Reading status read 
- The sender MMSI
- Message Type either TXT (i.e. Free Text) or SRM (Safety Related Message)
- Reception/Transmission Channel either A, B or Auto
- The message text: up to 151 characters for Free Text and 156 for SRM.

An example of the AIS INBOX Summary Table and associated minitote ordered by ascending range from the helicopter position is provided below:



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Figure 6-12 AIS INBOX Summary Table (example)

How to forward, reply and delete an AIS Message by MFD CONTROL MENU

A message either in the Inbox or in the Outbox can be forwarded to an AIS Object, furthermore, a sender of an incoming AIS Message can be replied with a new message.

Any incoming, sent and preset message can be deleted.

To forward to another AIS Object the selected Inbox or Outbox AIS Message, the Pilot has to press the FORWARD key of the MFD DMAP MESSAGE MENU (see figure below); once pressed, the AIS Objects Summary Table is presented to provide the list of destination addresses) with the Minitote presenting the AIS Message to be sent and previously selected (see next below).

On this presentation, the Pilot can:

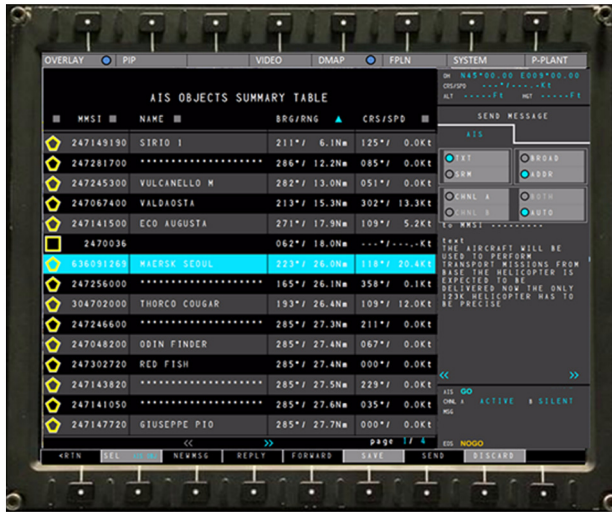
- save the selected message into the Preset list (for further use);

- discard the message forwarding re-selecting the Inbox AIS Message Summary table;
- send the message to be forwarded to the selected AIS Object or to the broadcast address (note that the SEND button will be active when the AIS equipment is capable to transmit message, e.g. the Transmit Mode shall be different from Silent).



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Figure 6-13 Forward, reply and delete an AIS Message by MFD control menu (1 of 5)



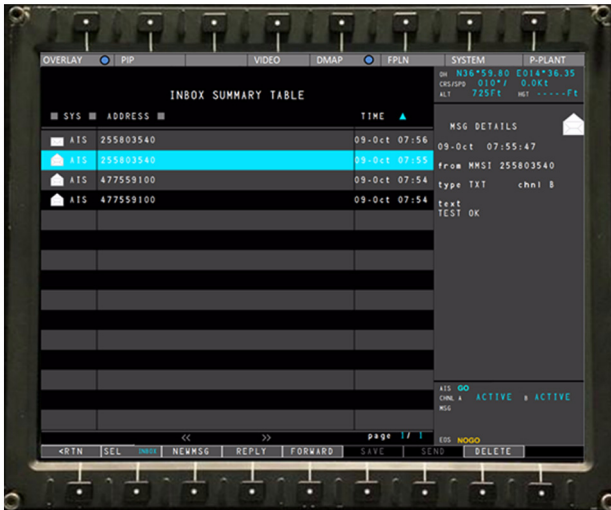
189G4600X008-0180-01

Figure 6-13 Forward, reply and delete an AIS Message by MFD control menu (2 of 5)

To reply a message to the sender of an incoming message, the Pilot has to press the REPLY key of the MFD DMAP MESSAGE MENU into the Inbox AIS Summary Table (see figure below); once pressed, the AIS Preset Message Summary Table is presented to provide the list of predefined messages) with the Minitote presenting the selected AIS address (see next figure below).

On this presentation, the Pilot can:

- save the selected message into the Preset list (for further use);
- discarde the message reply re-selecting the Inbox AIS Message Summary table;
- send the message to be replied to the selected AIS Object or to the broadcast address (note that the SEND button will be active when the AIS equipment is capable to transmit message, e.g. the Transmit Mode shall be different from Silent).



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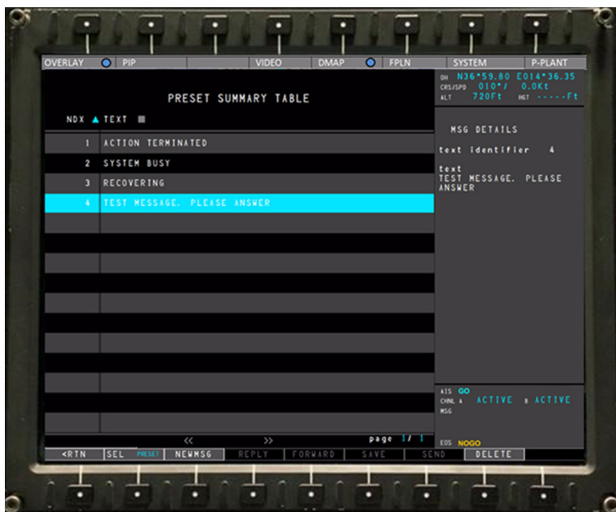
Figure 6-13 Forward, reply and delete an AIS Message by MFD control menu (3 of 5)



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Figure 6-13 Forward, reply and delete an AIS Message by MFD control menu (4 of 5)

To delete an AIS Message either from the Inbox or Outbox or Preset Summary Table, the Pilot has to select the involved message and press the DELETE key of the MFD DMAP MESSAGE MENU.



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Figure 6-13 Forward, reply and delete an AIS Message by MFD control menu (5 of 5)




RADAR MANAGEMENT

According to the helicopter configuration, when the Option RADAR is equal to "RDR-1500B+", the Mission functionalities includes the management of the following Radar functions:

- Radar Tracks display on TSD and Summary Table
- Creation of an FMS Waypoint (i.e. SEND FMS) from the selected Radar Track
- Pointing the EOS on the position of the selected Radar Track.

RADAR TRACKS DISPLAY ON TSD

The following Radar Tracks are graphically displayed on the TSD:

-  , Radar Track with Quality set to "0" Acquiring;
-  Radar Track with Quality set from "1" to "7" (where: "1" = VERY HIGH, "2" = HIGH, "3" = MEDIUM, "4" = LOW, "5" = MANEUVRING, "6" = CROSSING, "7" = TARGET SPEED LIMIT EXCEEDED);
-  Radar Track with Quality set from "8" to "9" (where "8" = TARGET FROZEN, "9" = LOST).

A maximum number of 20 Radar Tracks can be stored into Radar Tracks Database.

The Radar Tracks are automatically created once they have been promoted by the Radar Control Panel; the Radar Tracks are automatically deleted when deleted by the Radar system.

Any Radar Track is uniquely identified by its Track Number (i.e. the ID).

Each Radar Track is identified by means of a label displayed on the bottom left of the symbol reporting either the Track Number or the Waypoint Name (i.e. when the Radar Track has been used to create an FMS Waypoint).

The Radar INFO area, when displayed, provides the following Radar Track information:

- Identification Number (i.e. from 1 to 20, the same displayed by the Radar RDR-1500B+ autonomous presentation);
- Quality in the format "X:@@@@@@@@@@" (where X ranges from 0 to 9 with the corresponding textual description as described above);

- Position;
- Course and Speed;
- Reference Time (i.e. time of the last update).

An example of TSD graphical view with INFO area displayed reporting Radar Track information is provided:



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Figure 6-14 RADAR Tracks display on TSD

How to select a Radar Track by CCD

The Pilot can select a Radar Track on the TSD and display the associated minitote, with the following steps:

- position the cursor on top of the corresponding symbol;

- push the CCD inner knob or pull the lateral chinese key to display the following pop-up menu:

OBJECT INFO
SEND FMS
POINT EOS
ORIGIN

- move the cursor on top of the “OBJECT INFO” label and push either the CCD inner knob or pull the lateral chinese key.

Note

The “POINT EOS” label is displayed or not according to the helicopter configuration (i.e. Option: FLIR equal to “SS380HD”).

As soon as the Radar Track is selected, the symbol is highlighted as follow and the associated information details are displayed on the minitote.



Note

When the cursor is positioned on top of two or three symbols, a selection pop-up menu is presented to provide the Pilot the capability to select the Radar Track of interest; an example of the selection pop-up menu is provided below:

RDR TK 2
RDR TK 7
RDR TK 14

Note

When the cursor is positioned on top of more than three symbols, a clutter pop-up menu is presented; the Pilot should zoom in to remove display congestion; an example of the clutter pop-up menu is provided below:



RADAR TRACKS DISPLAY ON SUMMARY TABLE

The Radar Tracks can also be displayed on alphanumerical tabular form (i.e. in so called "Summary Table") as described below.

The following interactions are available on the Radar Tracks Summary table:

- a. Order ascending/descending the Summary Table content according to the following parameters:
 - Identification Number
 - Quality
 - Range
- b. Browse the Summary Table content;
- c. Select, via the CCD, a Radar Track to display detailed information on the minitote;
- d. Create an FMS Waypoint (i.e. SEND FMS) from the selected Radar Track;
- e. Point the EOS on the current position of the selected Radar Track;
- f. Declutter (i.e. filter on display) the Radar Track presentation.

When the Radar Track database is near to be filled up, the following caption, in yellow, is displayed next to the Summary Table title: "OVERLOAD -X" (where X ranges from 5 to 1) or "OVERLOAD".

An example of Radar Track Summary Table is provided below:



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Figure 6-15 Radar Tracks Summary Table

How to activate the Radar Track Summary Table by MFD CONTROL MENU



The Pilot can activate/de-activate the Radar Track Summary Table presentation through the RDR OBJ ... button on the MFD DMAP CONTROL MENU 2/2.



Activating the Radar Tracks Summary Table presentation, the following MFD DMAP CONTROL MENU is displayed:



How to order the Radar Tracks Summary Table by CCD

The Pilot can order (ascending/descending) the Radar Tracks Summary Table presentation placing the CCD on top of the square (i.e. ) or triangle (i.e. ) symbol on the header line.

An example of the Radar Tracks Summary Table ordered by ascending range from the helicopter position is provided below:



RADAR TRACKS SUMMARY TABLE							
ID	■	QUALITY	■	BRG/RNG	▲	CRS/SPD	TIME

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Figure 6-16 Radar Tracks Summary Table ordered by CCD (example)

How to browse the Radar Tracks Summary Table by CCD

Each page can display up to 15 Radar Tracks; when more than 15 Radar Tracks are present, adjacent pages can be selected using the outer knob of the CCD.

The Pilot can browse adjacent Radar Tracks Summary Table pages by turning clockwise and counterclockwise the outer knob of the CCD.

How to select a Radar Track by CCD

The Pilot can select a Radar Track on the Summary Table by placing the cursor on top of the corresponding row and pushing the inner button of the CCD rotary knob.

As soon as the Radar Track is selected, the row is highlighted in cyan and the associated information details are displayed on the minitote.

RADAR TRACKS INTERACTIONS

The following interactions are available on the Radar Tracks:

- Create an FMS Waypoint (i.e. SEND FMS) from the selected Radar Track;
- Point the EOS on the current position of the selected Radar Track;
- Declutter (i.e. filter on display) the Radar Track presentation on TSD.

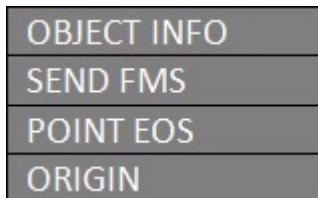
Note

The EOS functions are available when the Option FLIR is equal to "SS380HD".

How to create an FMS Waypoint from a Radar Track by CCD and MFD

The Pilot can create an FMS Waypoint from the selected Radar Track; the creation can be performed on:

- the TSD presentation through the CCD selecting the SEND FMS label of the pop-up menu:



- the Summary Table presentation through the MFD selecting the SEND FMS label of the DMAP CONTROL MENU:



The FMS item will be always a Moving Waypoint even if the Radar Track course and speed data are not available at the creation time.

Note that the created Moving Waypoint is periodically updated according to the motion of the associated Mission item until deleted.

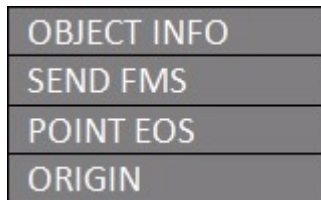
Once the FMS Waypoint has been created, the Identification Number near the Radar Track symbol is replaced by the Waypoint name (i.e. MMOVxx, where xx is an incremental number from 01) and the SEND FMS is inactive for that Radar Track.

The SEND FMS key on DMAP CONTROL MENU is displayed inactive when there is not a selected Radar Track.

How to point the EOS on a Radar Track by CCD and MFD

The Pilot can point the EOS on the position of the selected Radar Track; the pointing can be performed on:

- the TSD presentation through the CCD selecting the POINT EOS label of the pop-up menu:



- the Summary Table presentation through the MFD selecting the POINT EOS label of the DMAP CONTROL MENU:



Note that the EOS is pointed on the Radar Track position at the activation time (i.e. one shot pointing).

The POINT EOS key is displayed inactive when there is not a selected Radar Track or the EOS pointing is not possible due to the EOS equipment status.

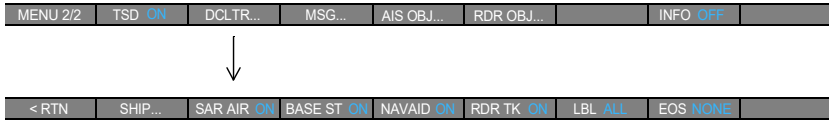
How to declutter the Radar Tracks by MFD CONTROL MENU

The Pilot can declutter the display of the Radar Tracks on the TSD through the DCLTR... button on the MFD DMAP CONTROL MENU 2/2.

Pressing the DCLTR... button, the MFD DMAP DECLUTTER MENU as reported below is selected; on this menu, the Pilot can select:

- the display (i.e. ON) or the remove (i.e. OFF) of the Radar Tracks on TSD

- the Identification Number display among NONE (i.e. no label), NAME or ALL (i.e. either the Identification Number or the FMS Waypoint Name).



EOS MANAGEMENT

According to the helicopter configuration, when the Option FLIR is equal to “SS380HD”, the Mission functionalities includes the management of the following EOS functions:

- EOS Status display on Minitote
- EOS Field Of View and Line Of Sight display on TSD
- EOS Laser Range Finder shooted point display on TSD (i.e. Target position)
- Creation of an FMS Waypoint (i.e. SEND FMS) from the selected EOS LRF target position
- Pointing the EOS on the position of the selected Mission item.

EOS STATUS DISPLAY ON MINITOTE

The EOS status as GO or NOGO is displayed on the last row of the Minitote area as described below.

Note that, until the EOS is not providing valid LOS position data, the reported EOS Status will be NOGO.



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Figure 6-17 EOS Status on Minitote area

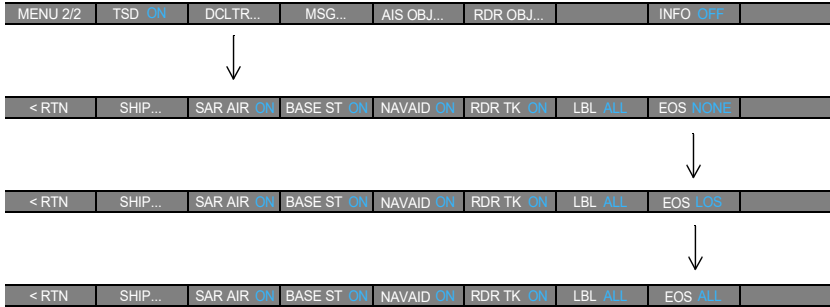
HOW TO DISPLAY THE EOS ITEMS BY MFD CONTROL MENU

The Pilot can activate/de-activate the display on TSD of the Field Of View, Line of Sight and LRF Target position through the DCLTR ... button on the MFD DMAP CONTROL MENU 2/2.

Pressing the DCLTR... button, the MFD DMAP DECLUTTER MENU as reported below is selected; on this menu, the Pilot can select:

- the display of the Line Of Sight and LRF Target position only (i.e. EOS "LOS" default);
- the display all the EOS items such as LOS, FOV and LRF Target position (i.e. EOS "ALL");
- the removal of the EOS items (i.e. EOS "NONE");
- the display of LRF Target elevation (on the right side of the symbol) between no label (i.e. LBL "NONE") or the relevant value (i.e. LBL different from "NONE");

- the display of the FMS Waypoint Name (on the left side of the symbol) associated to the LRF Target between no label (i.e. LBL "NONE" or "NAME") or the relevant name (i.e. LBL equal to "ALL").



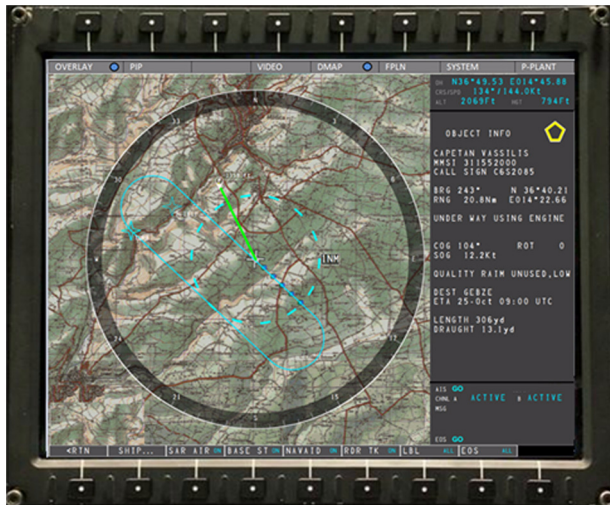
An example of EOS LOS and FOV display is provided below:



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Figure 6-18 EOS LOS and FOV display

An example of EOS LOS and LRF Target position display is provided below:

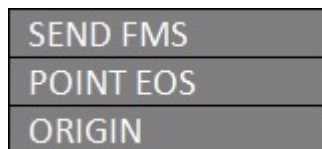


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Figure 6-19 EOS LOS and LRF Target position display

HOW TO CREATE AN FMS WAYPOINT FROM AN EOS LRF TARGET POSITION BY CCD

The Pilot can create an FMS Waypoint from the selected EOS LRF Target position; the creation can be performed on the TSD presentation through the CCD selecting the SEND FMS label of the pop-up menu:

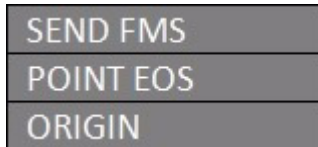


The FMS item will be always an User Waypoint.

Once the FMS Waypoint has been created and the Declutter filter LBL is set to "ALL", the Waypoint name (i.e. MWPTxx, where xx is an incremental number from 01) will be displayed near the symbol.

HOW TO POINT THE EOS ON A LRF TARGET BY CCD

The Pilot can point the EOS on the position of the selected LRF Target; the pointing can be performed on the TSD presentation through the CCD selecting the POINT EOS label of the pop-up menu:



Note that the EOS is pointed on the LRF Target position at the activation time (i.e. one shot pointing).

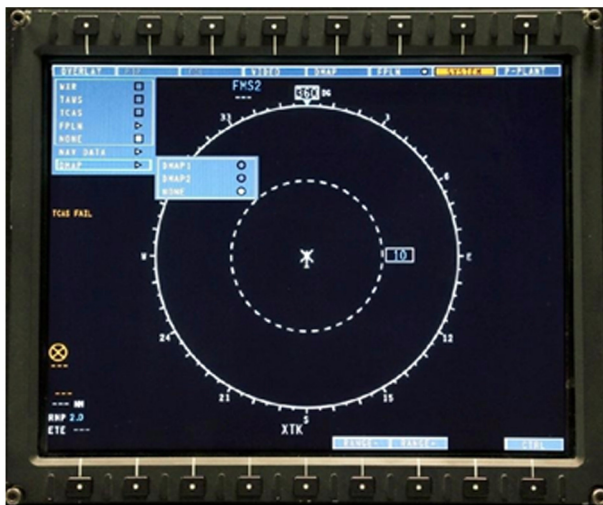
The POINT EOS key is displayed inactive when there is not a selected LRF Target or the EOS pointing is not possible due to the EOS equipment status.

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SECTION VII

FMS INTERACTIVITY

The DMG is displayed also in the MFD FPLN page. The Pilot shall select the FPLN page on the top MFD control menu, then OVERLAY button and then select DMAP1 or DMAP2 (note that DMAP1 is available in the cockpit when no Mission Computer is installed in the cabin).



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Figure 7-1 FMS INTERACTIVITY 1/5



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Figure 7-2 FMS INTERACTIVITY 2/5

In this format the digital map is considered as cartography only and can be underlaid to the FPLN symbols. All interactive functions relevant to the FPLN are present and all symbols and information on the screen is like the FPLN Page.

The DMAP is displayed in all FPLN formats (ROSE, ARC, PLAN, FMS DATA) when the cartography is available in the database.



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Figure 7-3 FMS INTERACTIVITY 3/5

When FPLN Page is selected on one MFD and DMAP is underlay to FPLN, the DMG will inhibit the operative functions such as the Search Management, Move Management, Centring Management, the Display Mode Selection and the Range Management. In this case the MFD DMAP CONTROL MENU will not be operative.



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Figure 7-4 FMS INTERACTIVITY 4/5

Layers management will only be available from MCDU in terms of Layers ON/OFF but not from CDS Interface.



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Figure 7-5 FMS INTERACTIVITY 5/5

When the same DMAP is underlay to two MFDs with FPLN Page, the map is displayed only when all the video settings parameters (i.e. center, scale, zoom, orientation) are matching, otherwise the MFD is removing the video and generating the “DMAP FAIL” message.

As a consequence, when the Pilot is changing the format or the range in one MFD with FPLN and DMAP in underlay, the other MFD with FPLN and DMAP in underlay will generate the “DMAP FAIL” message and remove the video.

The last Pilot interactions are performed on the MFD under control and the other MFD will remove the video.

Note

When a FPLN Page is selected on a MFD and a DMAP is underlay to FPLN, the Operator should not use the same DMAP on the other MFD.

When the Mission Management functionalities are provided (i.e. Option “SAR LAYERS” or “SAR FULL”), the MFD FPLN page can provide, as overlay, the graphical part of the Tactical Situation Display presentation (i.e. without Minitote); this can be enabled through the TSD button of the OVERLAY label of the top MFD control menu.

No interactions are foreseen on the mission items displayed on the TSD layer when in the FLPN page.

[Functional limitation: In FPLN page with map as underlay and PLAN mode and MAG Heading selected, when the H/C heading angle is close to 180°, the map could be not aligned to the heading. The map rotates of an angle equal to the opposite of the true heading minus the Magnetic variation. This happens when the sum of true heading and magnetic variation exceeds 180°. The rotation is about 180° and so the error is obvious to the operator.]

[Functional Limitation: When the helicopter has been powered off with DMAP slaved to FPLN page on one MFD, at the next avionic restart the DMAP is presented to the default dataset condition and the message DMAP RNG Miscompare is displayed on FPLN page. The DMAP presentation can be recovered from the user disabling first the DMAP from the menu OVERLAY in FPLN page format and the map preset re-selected from the EDCU pages or LAYERS virtual control panel from DMAP page.]

SECTION VIII

TROUBLESHOOTING

In this chapter some troubleshooting are provided in case of unexpected behaviour.

DMP ERROR MESSAGES

SYSTEM FAILURE MESSAGE

If the "DMP FAIL" error message is displayed on the MFD/MCC then there is a DMP system failure: no database (PRIMARY or BACKUP) is correctly downloaded by the DMP system or the DMG STATUS is FAIL. The map video background is BLACK.

DMP FAIL

Please change the current database with a correct one (PRIMARY and BACKUP) and check the CRC and PN of DMG and of the database are the expected one.

POSITION FAIL MESSAGE

If the "DMP POS FAIL" message is displayed on the MFD/MCC then the helicopter current position is not received by the map.

DMP POS FAIL

Please check the status of the helicopter position sensors.

HEADING FAIL MESSAGE

If the “DMAP HDG FAIL” message is displayed on the MFD/MCC then the helicopter current heading is not received by the map.

DMAP HDG FAIL

Please check the status of the corresponding helicopter attitude and heading sensors.

NO MAP AVAILABLE MESSAGE

If the DMAP system is not able to display any cartography data at a specific range step (Raster, Vector or Mission Vector), then the “NO MAP AVAIL” message is displayed on the MFD/MCC.

NO MAP AVAIL

Please change the current map range step in order to display an available cartography.

POSITION MISCOMPARE MESSAGE

In MFD FPLN page with DMAP overlay selected, DMAP Position Discrepancy annunciation is displayed when the map center position is different from the DU center position for more than 2 seconds.

DMAP1 POS MSCP

DMAP2 POS MSCP

RANGE MISCOMPARE MESSAGE

In MFD FPLN page with DMAP overlay selected, DMAP Range Discrepancy annunciation is displayed when the map Range is different from the DU Range for more than 2 seconds.

DMAP1 RNG MSCP**DMAP2 RNG MSCP****HEADING MISCOMPARE MESSAGE**

In MFD FPLN page with DMAP overlay selected, DMAP Heading Discrepancy annunciation shall be displayed when the map orientation is different from the DU orientation for more than 2 seconds.

DMAP1 HDG MSCP**DMAP2 HDG MSCP**

MISSION FAIL

When the Mission Management functionalities are provided (i.e. Option "SAR LAYERS" or "SAR FULL"), if the Mission presentation is detected in fail by the MFD, the "MISSION FAIL" message is displayed for five seconds and then removed.

The Pilot shall change the MFD format taking into account that the DMAP functionalities are still available.



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Figure 8-1 "MISSION FAIL" message on MFD

APPENDIX A

LIST OF ACRONYMS

AIS	Automatic Identification System
CCD	Cursor Control Device
CDS	Control and Display System
DMAP	Digital Map
DMG	Digital Map Generator
DTD	Data Transfer Device
DU	Display Unit
EDCU	Enhanced Display and Control Unit
EGPWS	Enhanced Ground Proximity Warning System
EOS	ElectroOptical System
ETA	Estimated Time of Arrival
FMS	Flight Management System
FOV	Field Of View
GA	Go Around
ILS	Instrument Landing System
HMI	Human Machine Interface
LDS	Lightening Detection System
LOS	Line Of Sight
LRF	Laser Range Finder

MFD	Multi Functional Display
RA	Radar Altimeter
RAIM	Range Autonomous Integrity Monitoring
SAR	Search And Rescue
SID	Standard Instrument Departure
SOLAS	Safety Of Life At Sea
SSD	Solid State Device
STAR	Standard Terminal Arrival Rules
TSD	Tactical Situation Display
VOR	VHF Omni directional Range
WPT	Waypoint